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DEVELOPMENT OF A PLAN FOR AN INTENSIVE STUDY OF AUTOMATION AND ITS IMPLICATIONS FOR EDUCATION.

BY- WHITLOCK, JAMES W.
GEORGE PEABODY COLL. FOR TEACHERS, NASHVILLE,TENN.

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A DETAILED STUDY MODEL WAS DEVELOPED FOR COMMUNITY USE IN STUDIES OF AUTOMATION AND ITS IMPLICATIONS FOR THE EDUCATIONAL PROCESS. THREE SPECIFIC STEPS WERE INVOLVED IN DEVELOPING THIS MODEL--(1) A COMPREHENSIVE STUDY PLAN WAS DEVELOPED WHICH INCLUDED THE SPECIFIC DATA TO BE COLLECTED, AND DESIGN AND ANALYTICAL PROCEDURES FOR THE COLLECTION PROCESS, (2) THE STUDY PLAN WAS TRIED OUT IN A PILOT SITUATION AND LOCATION, NAMELY, THE NASHVILLE-DAVIDSON COUNTY METROPOLITAN AREA IN TENNESSEE, AND (3) THE STUDY PLAN WAS THEN REVISED ON THE BASIS OF PILOT EXPERIENCES. FOUR MAJOR FACETS OF INVESTIGATION TO BE CONSIDERED WERE INCLUDED IN THE FINAL STUDY PLAN OR MODEL--(1) BASIC BACKGROUND INFORMATION ON THE COMMUNITY, (2) THE EXTENT TO WHICH COMMUNITY INDUSTRIES ARE AUTOMATING, THE NATURE OF AUTOMATED JOBS IN THE COMMUNITY, AND THE EDUCATIONAL AND TRAINING REQUIREMENTS OF THESE AUTOMATED JOBS, (3) THE STATUS OF ELEMENTARY, SECONDARY, OUT-OF-SCHOOL, AND ADULT EDUCATION PROGRAMS AND PERSONNEL IN THE COMMUNITY AND OF CURRENT VOCATIONAL AND TECHNICAL EDUCATIONAL OPPORTUNITIES IN THE COMMUNITY, AND (4) THE CHANGES IN THE PROGRAM OF EDUCATION WHICH ARE DICTATED BY THE CHANGING REQUIREMENTS OF AUTOMATION. (JH)

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DEVELOPMENT OF A PLAN FOR AN INTENSIVE STUDY OF AUTOMATION AND ITS IMPLICATIONS FOR EDUCATION

Cooperative Research Project No. S-264

James W. Whitlock
George Peabody College for Teachers
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Chapter 1

INTRODUCTION

Many of the promises and many of the problems of automation have become realities in American life. No longer must we speak of the "advent of the automatic factory." Automation has "arrived." During the past decade, automation itself has become an industry. The increases in manufacture of automatic equipment for machine and process control of the factory have been complemented by the phenomenal growth of the electronic data processing equipment industries servicing both factory and office. The whole new field of computer technology has passed from infancy to a stage of high complexity and sophistication.

Automation in our nation and the world today involves so sharp an acceleration of technological change as virtually to inaugurate a new epoch. Without wise and vigorous foresight and action, it can have violently disruptive effects. Since a major purpose of automation is to increase productivity per man and to save costs, automation adds to the high rate of unemployment currently causing widespread national concern. Numerous dislocations occur, requiring transfer and adjustment of workers to new occupations or new industries. For some workers, the transition to a new kind of job is feasible, but to others the process may be painful, demoralizing, and seemingly beyond their individual capabilities.

Technological change has implications not only for the displacement and adjustment of the present labor force, but also for the education of those new workers who are or will be preparing for a vocation and who will begin their job hunting sometime in the future. Changing technology means new industries and new kinds of jobs which require different skills from those of the past.

All of these factors have implications for workers as individuals and for organized labor, management, the community, and the government. In turn they have grave implications for programs of education--apprenticeship programs, employer training programs, community programs of public education, grades 1 through 12, adult education programs, and other formal programs of education beyond the high school and through the university.

In fact, there is overwhelming evidence to support the thesis that technology has created a new relationship between man, his education, and his work, in which education is placed squarely between man and his work.[1] Although this relationship has traditionally held for some men and some work (on the professional level, for example), modern technology has advanced to the point where the relationship may now be said to exist for all men and all work.

The Problem

Because of the vital role education plays in the present technological revolution and with the belief that vigorous community action is needed to alleviate the problems created by automation, the Nashville Conference on Automation and Education was held on January 18, 1964. The Conference, called by Congressman Richard Fulton and cosponsored by George Peabody College for Teachers, brought together approximately 150 community leaders to consider the role of industry, labor, public education, and other community agencies in meeting the challenges of automation through education. The response to the work done at the conference was so great that it was decided a permanent community committee on Automation, Education, and Employment should be established.

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[1] Grant Venn, Man, Education, and Work. Washington, D. C.: American Council on Education, 1964, p. 1.

The membership of the Committee included some twenty-five representatives from the fields of industry, business, labor, government, and education. The function of the Committee was to stimulate local action and to coordinate community efforts to overcome the economic and social problems created by automation. A thorough study of automation and its implications for education in the metropolitan area was seen as a necessary preliminary step to Committee action. The Committee realized, however, that prerequisite to a sound study was the development of an adequate and detailed plan for making the study. The plan had to be carefully conceived if valid results were to be obtained. The Committee requested the help of George Peabody College for Teachers in designing a study plan. The College then submitted a Small Contract Proposal to the Cooperative Research Branch to secure funds for developing a plan for an intensive study of automation and its implications for education in the Nashville metropolitan area.

While each individual community will be somewhat unique in its problems of automation, the procedures required to assess the various local situations and to plan sound action programs can be fairly uniform. The detailed plan for an intensive study of automation and its implications for education in the Nashville-Davidson County Metropolitan Area should be of value to other communities in making similar self studies.

The Objectives of the Study

The primary goal of this project was to develop a detailed plan for an intensive study of automation and its implications for education in the Nashville-Davidson County Metropolitan Area. The study plan will serve as a model for other communities to use in a similar self study.

More specifically the project was directed toward the fulfillment of the following objectives:

1. To determine the scope of the study, including the specific questions to be answered by the study and the data essential to answering these questions
2. To develop efficient procedures for collecting the data, including the design of all data-gathering instruments
3. To describe the procedures for analyzing the data to assess the implications for local action
4. To try out the developed study plan in a pilot situation
5. To revise the study plan on the basis of the pilot experience.

Procedures

Three specific steps were involved in developing the study plan. In step one the project staff developed a detailed plan for the study. The plan included the specific data to be collected, the procedures for collecting the essential information, including the design of all data-gathering instruments, and the detailed procedures for analyzing the data to assess the implications for action. In step two, the plan for the study was tried out in a pilot situation. Data collected on the trial run were analyzed as to its adequacy. Step three of the project involved the necessary revision of the study plan on the basis of the pilot experience.

The specific procedures used to develop the detailed plan for the study are outlined as follows:

I. The project staff developed the scope of the study, which included the specific questions to be answered by the study and the data essential to answering these questions.

   A. Available literature bearing on the problem was assembled and analyzed.

   B. Special studies made in other communities and bearing on the problem were identified. Reports of several of these studies were secured and analyzed.

   C. Drawing on the available literature and the reports of special studies, the scope of the proposed study was drafted in tentative

form. The proposed outline of the study included the specific questions to be answered and the specific data essential to answering each question.

D. The project staff secured consultative help in reviewing the proposed scope of the study and made modifications in the proposed scope.

E. The scope of the study was then reviewed by the Committee on Automation, Education, and Employment and modified to incorporate suggestions and satisfy the reservations of the Committee.

II. The project staff identified the sources of the data for the study, and designed the data-collection instruments.

A. Possible sources of data were identified and data-collection instruments were designed in tentative form.

B. The possible sources of the data and the data-collection instruments were reviewed by the Committee on Automation, Education, and Employment and were modified to incorporate the suggestions and satisfy the reservations of the Committee.

III. The study plan was tested in a pilot situation.

A. The feasibility of using the proposed sources of data was checked by tabulating partial data.

B. Data-gathering instruments were tested through actual distribution to pilot sample of respondents.

IV. The study plan was revised on the basis of the pilot experience.

Chapter 2

REVIEW OF RELATED LITERATURE

Automation has become a word that creates fear or hope. To some researchers, it means a loss of jobs or skills for many members of our society; for others, it means either more jobs or less work per person. It is too soon to know what the ultimate effects of automation will be, but those who have been doing research on its impact generally agree that it will tend to change the nature of work and thereby the educational requirements needed for jobs in an automated society--or indeed in an automated office or factory. Certain trends appear clear: the nature of the labor force is changing; the kinds of jobs available are altering; the need for different skills is growing. All of these trends, plus others to be discussed, have implications for educational systems and communities trying to achieve full employment for their members.

Automation's Meaning

The term "automation" itself has many meanings. Ralph J. Cordiner, former president of General Electric, has defined it as "'continuous automatic production,' largely in the sense of linking together already highly mechanized individual operations."[1] Yet, in common usage, automation has a much wider meaning and has become subsumed under the broader term, technological change. The reason for this is the belief that the rate of technological change has increased in the past decade and that automation is its most important component.

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[1] Cited in Edgar Weinberg, "An Inquiry Into the Effects of Automation," Monthly Labor Review, January 1956, p. 7.

Speed of Automation's Impact

Like so many other aspects of automation, the evidence is not complete as to the speed with which industry is making use of technological change and automation. Most observers agree that if management is applying such changes at a much more rapid rate than in the past, the implications for society are greater, for there will be less time to cushion their impact on employment and society. Thus, William O. Baker, Executive Vice President of Bell Laboratories, points to the rapid increase in the number of scientists and the ever-increasing sums of money given to research and development. More important, he notes the narrowing gap between a discovery and the application of that discovery. He gives some examples:[2]

Innovation	Year of Discovery	Year of Application
Electric motor	1821	1886
Vacuum tube	1882	1915
Radio broadcasting	1887	1922
X-ray tubes	1895	1913
Nuclear reactor	1932	1942
Radar	1935	1940
Atomic bomb	1938	1945
Transistor	1948	1951
Solar battery	1953	1955
Stereoscopic rubbers and plastics	1955	1958

The speed with which automated equipment is being used is further indicated by the following: the general adoption of the steam engine took about a century; electric power took fifty years. On the other hand, the first automated accounting systems were installed in banks about nine to ten years ago. Today, more than one-half of the banks in the United States have these systems or are installing them.[3]

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[2] William O. Baker, "The Dynamism of Science and Technology," pp. 85-90, and Eli Ginzberg, "Confrontations and Directions," pp. 139-142 in Eli Ginzberg, ed., Technology and Social Change, New York, Columbia University Press, 1964; Seymour L. Wolfbein, "The Pace of Technological Change and the Factors Affecting It," in U. S. Department of Labor, Manpower Implications of Automation, Washington, Government Printing Office, 1965, pp. 18-22, hereafter cited as Manpower Implications.

Automation's Overall Impact

The rapidity with which technological change is taking place not only gives less time to make ready for its impact on employment, but it also is helping to alter the labor force. Most researchers agree that a greater share of our labor force is working at white collar or service jobs and a smaller share in production. They also contend that the nature of the jobs within these categories appears to be changing also. White collar jobs are becoming more like blue-collar. For example, many skilled tasks in the office have been taken over by machines and the employees have now become "baby-sitters" for such operations. In addition many production jobs have been altered so that the tasks done are more like white-collar work with the machines being directed by office personnel who use IBM cards to tell the machines what to do. Both the increase in the number of white collar and service positions and the change even within these categories have necessitated changes in the training prerequisite for these occupations.[4]

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[3] 3. Charles C. Killingsworth, "Automation, Jobs, and Manpower," in Subcommittee on Employment and Manpower, United States Senate, Selected Readings in Employment and Manpower-Exploring the Dimension of the Manpower Revolution, Washington, Government Printing Office, 1964, pp. 203-204, hereafter cited as Selected Readings.

[4] 4. Bureau of National Affairs, White Collar Report, January 2, 1961, pp. A1-A2; J. H. Fogen, "Toward Job-Situation Homogeneity," Business Topics, Autumn 1962, p. 50; Paul G. Kaponya, "Salaries for All Workers," Harvard Business Review, May-June 1962, pp. 49-57; Floyd C. Mann, "Psychological and Organizational Impacts," in John Dunlop, ed., Automation and Technological Change, Englewood Cliffs, Prentice Hall, 1962, pp. 43-65.

Moreover, the steady rate of unemployment at a higher level than considered desirable has been at least partially blamed by researchers on automation and technological change. A machine's function is to replace labor. Its use means that the workers affected by such a change have to learn new skills either to handle the new machine or to work at a different position, or it may mean unemployment. Part of the unemployment problem could be solved by increased demand or by retraining the displaced worker for employment in other fields. It is the effects of these solutions upon the educational system, as reflected in research literature, that will be discussed in the remainder of this report.

Changes in the Labor Force

Seymour L. Wolfbein, when director of the Labor Department's Office of Automation and Manpower, pointed out that automation appears to have accelerated a trend in the direction of more highly skilled, white-collar, service-related positions. He gives the figures:[5]

	1910	1950	1960
ALL WORKERS	100%	100%	100%
WHITE COLLAR	22	37	43
Professional and Technical	5	9	11
Proprietary and managers	7	9	11
Clerical and sales	10	19	21
BLUE COLLAR	37	41	36
Skilled	12	14	13
Semiskilled	14	21	18
Unskilled	11	6	5
SERVICE	10	10	13
FARM	31	12	8

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[5] Seymour L. Wolfbein, "Automation and Skill," in Charles C. Killingsworth, ed., Automation, The Annals of the American Academy of Political and Social Science, March 1962, p. 54.

Wolfbein does not argue that technological changes alone are responsible for those trends, but he is "certain" that "they did have a significant role . . ."[6]

Beaumont and Helfgott note this change in distribution of types of employees in their examinations of the impact of automation on specific companies. They report that technological change and automation have resulted in specific companies reducing the number of production workers and increasing the number of maintenance and service workers, as well as white-collar employees. They give many examples of which one might suffice. A multi-product food processing plant installed automated equipment. The following tabulation tells the story:[7]

Type of Work	Pre-automation Employment (per cent)		Post-automation Employment (per cent)	
Direct production work		77.9		51.8
Skilled	3.7		20.4	
Semiskilled	22.5		20.9	
Unskilled	51.7		10.5	
Maintenance Work		21.4		36.1
Technical Work		0.7		12.0
TOTAL		100.0		100.0

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[6] Loc cit.

[7] Richard A. Beaumont and Roy B. Helfgott, Management, Automation and People, New York, Industrial Relations Counselors, 1964, pp. 33-42 (table from p. 39); see also Ewan Clague, "Effects of Technological Change in Occupational Employment Patterns in the United States," in Manpower Implications, pp. 33-36; throughout a number of Congressional hearings dealing with manpower are statements dealing with points made in this analysis. See Hearings before the Subcommittee on Employment and Manpower, "National Manpower Revolution," United States Senate, 88th Congress, First Session, 1963 and the Subcommittee's Report, "Toward Full Employment: Proposals for a Comprehensive Employment and Manpower Policy in the United States," Washington, Government Printing Office, 1964; Hearings before the Subcommittee of the Select Committee on Small Business, "The Role and Effect of Technology in the Nation's Economy," United States Senate, 88th Congress, First Session, 1963.

The researchers believe these trends will continue. The *Report on Manpower of the President* estimates that by 1975 the employment of professional and technical workers may increase by "well over two-fifths," clerical and sales help by one-third, and service workers also by about two fifths. Thus, these three categories will increase more than the average rate. Managers and craftsmen will increase at an average rate, operatives at less than an average rate, and the number of farm workers will decrease.[8]

Effects of Changes in Skill Requirements

In general, what the above changes mean is succinctly described by Wolfbein. He states that "the overriding fact remains that the trends just discussed have been accompanied by a significant upturn in the educational and training prerequisites for employment."[9] He analyzes the same issue elsewhere in this fashion: "A country with a working population in which one in ten is an unskilled laborer and one in twenty is a professional person is bound to have different educational and training prerequisites for the world of work from those in a country in which more than one in ten is a professional person and only one in twenty is an unskilled laborer. This kind of reversal is exactly, of course, what has happened in the United States over the last fifty years . . ."[10] Moreover, he states that the kind of training needs today "are far more complex and extensive than they were a half-century ago." And he gives the following examples of jobs requiring more training today: skilled tool and die maker, the semiskilled machine tool operator, the retail sales clerk, "and even . . . many . . .unskilled jobs." He concludes that "the expectations are that accelerated automation and technological change will add to rather than diminish the problem here."[11]

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[8] *Manpower Report of the President*, Washington, Government Printing Office, 1965, pp. 54-55.

[9] Wolfbein, *op. cit.*, p. 55.

[10] Seymour L. Wolfbein, "Labor Trends, Manpower, and Automation," in Henry Borow, ed., *Man in a World at Work*, Boston, Houghton Mifflin Co., 1964, pp. 164-165.

Other scholars in analyzing whether automation has resulted in increased skill requirements have, at times, looked at the trees instead of the forest. They have examined specific types of jobs and have interpreted their findings on the basis of whether the impact of automation has resulted in these jobs requiring more or less skills. Thus, in looking at office employees, Stieber reports that:

> In general, labor leaders, businessmen and scientists seem to be agreed that whatever its effect on employment, the advent of electronic computers into the office will result in the upgrading of skills, the redistribution of the workforce in the shape of higher proportion of skilled jobs, and the virtual elimination of tedious, repetitive, clerical operations.[12]

John Diebold, a leading management consultant in the automation field, echoes this reaction when he states that "a whole stratum of dull, repetitive, low-paid jobs, both in factories and offices, is going to be eliminated."[13]

But there are those who would argue the reverse; namely, that as a result of automation office skills have been downgraded with more dull, repetitive jobs taking the place of more stimulating ones.[14] It appears that, because of

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11. Ibid., p. 165.

12. Jack Stieber, "Automation and the White-Collar Worker," Personnel, Nov.-Dec., 1957, p. 11; see also U. S. Department of Labor, Bureau of Labor Statistics Bulletin No. 1287, "Impact of Automation," Washington, Government Printing Office, 1960, pp. 96-108.

13. Cited in Marvin J. Levine, "The Impace of Automation Upon Clerical Employment," The Personnel Administrator, July-August 1965, p. 31. For a discussion of the impact of automation on service workers, see Donald N. Michael, Cybernation: The Silent Conquest, Santa Barbara, California, Center for the Study of Democratic Institutions, 1962, pp. 15-17.

14. For a further discussion of these issues, see Everett M. Kassalow, "Automation and Technological Progress: Its Impact upon White Collar Workers in the United States," Paper presented before the German Metalworkers Union

automation, the number of both the more skilled and the lesser skilled jobs have increased in the white-collar occupations, as in other fields. These gains in the extremes makes it impossible to take a net balance. In overall terms, though, automation's general effect has been to reduce the number of unskilled jobs available and increase the number of higher skilled jobs.[15] Of major importance is the fact that there are more white-collar jobs than blue-collar jobs. This is important because white-collar jobs generally require more education than blue-collar jobs. Second, even if they did not require more education, white-collar jobs require different training--at least for those dispossessed from their blue-collar work.

Derek Bok, a consultant to the President's Committee on Labor-Management Policy, after a study of the problem, describes the issue thusly:

> . . . Fewer workers are generally required to produce the same amount of goods following the introduction of automated equipment. Since the workers who are displaced in this manner have generally been engaged in low-skill, routine tasks, and since areas of expanding employment often involve jobs that are demanding in nature, automation has helped indirectly to raise the level of skill and education that is required in the economy as a whole.[16]

Conference, July 1963; Albert A. Blum, Management and the White Collar Union, New York, American Management Association, 1963, pp. 59-70; Ida Russakoff Hoos, "When the Computer Takes Over the Office," Harvard Business Review, July-August 1960, pp. 102-112; Floyd C. Mann and Lawrence K. Williams, "Organizational Impact of White-Collar Automation," Annual Proceedings of the Industrial Relations Research Association, Madison, Wisconsin, 1958, pp. 59-69; James Bright, "Does Automation Raise Skill Requirements?" Harvard Business Review, July-August 1958, pp. 85-98; Edgar Weinberg, "Experiences with the Introduction of Office Automation," Monthly Labor Review, April 1960, pp. 376-380; and U. S. Department of Labor, Bureau of Labor Statistics Bulletin No. 1276, "Adjustments to the Introduction of Office Automation," Washington, Government Printing Office, 1960.

[15] For a discussion of this issue, and the various points of view, see Walter Buckingham, Automation: Its Impact on Business and People, New York, The New American Library, 1961, pp. 91-97.

[16] Derek Bok, Automation, Productivity and Manpower Problems, Washington, U. S. Department of Labor, 1964, p. 9.

Ewan Clague, former Commissioner of Labor Statistics, comes to a similar conclusion after analyzing how individual occupations are affected by the changing technology. He shows how recent technological changes have increased the skills necessary for jobs such as business machine servicemen, maintenance electricians, tool and die makers, and appliance servicemen. Then, he points out how other technological changes have reduced the skills for many other positions: shoemakers, machine tool operators, typesetters, intercity truck drivers, and carpenters. He concludes, however, after analyzing the overall changes in the labor force, that "technology, as such, even apart from other factors, is operating to raise skill levels generally."[17] He then argues, that

> In any case, frequency of occupational change may be as important as the upward trend in skill requirements. A worker who has acquired a certain skill in one occupation may be able to exercise that skill for the remainder of his working life; but he might find it extremely difficult to master a new skill, even though it would rate no higher than the first one. For example, a typist is no more skilled than a lathe operator; that is to say, the training requirements for a new entrant into each occupation could be about the same. However, it might be almost impossible for a lathe operator, 40 years of age, to become a typist; and likewise, a typist might be equally unable to become a lathe operator. So we need not prove that the skill level of the economy is increasing in order to demonstrate that occupational changes can produce unemployment /because of lack of training/. Any occupational change may have that result.[18]

The director of the United States Employment Service (USES), Louis Levine, after reporting on studies made of the effects of technological change on the nature of jobs, comes to a similar conclusion:

> The enormous changes taking place in the job structure of the American economy require a reorientation to our approach in preparing people for work. All the experience amassed by

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17. Clague, op. cit., p. 36.
18. Ibid., p. 37.

> the USES underscores one fact: Of all the resources needed for the Nation's economic well-being and advancement, its human resources require the longest leadtime to become effective. It takes years--20 or more--for a child to grow into a mature and useful adult and a competent member of the labor force. However, his vocational preparation does not end there. Because occupations are changing at an increasing rate, workers must be prepared to change with them. People will be changing careers--not jobs--three to four times in a lifetime. In this setting, job preparation cannot be limited to the acquisition of individual job skills. It must prepare the individual for greater flexibility with respect to the range of jobs for which he is potentially suitable. A worker must plan his career in terms of a progression of occupations with periodic retraining to keep abreast of changing methods and techniques, application of new materials, and related knowledges acquired.[19]

Impact of Education on Employment

Another way of looking at the problem of automation, skills, and employment is to examine those who are unemployed. The largest percentages of those unemployed are young workers, old workers, low skilled and poorly educated workers, and Negroes. When certain of these categories are combined, the unemployed rate goes up even higher: thus, half of the Negro teenagers in some cities are unemployed; their overall general unemployment rate is nearly one our of four (the overall unemployment rate during the Great Depression). The explanation offered for this phenomenon is that in the postwar years "jobs for low-skilled workers have disappeared at a faster rate than those people have died, retired, or given up looking for work. At the same time, jobs for highly-skilled workers have increased more rapidly than the supply of such workers. Therefore, . . . the unemployment problem has increasingly come to be concentrated in the low-skilled

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[19] Louis Levine, "Effects of Technological Change on the Nature of Jobs," in Manpower Implications, p. 50.

segment of the labor force."[20]

Professor Charles C. Killingsworth is one of the leading exponents of this view. He argues that between 1950 and 1962 the total number of jobs held by workers with only eight or fewer years of education (about the bottom third of the United States labor force) decreased by 6.2 million while the jobs held by men and women with college training (about the top 20 per cent of the labor force) increased by 5.3 million. Killingsworth indicates that this has been caused by a number of factors. Two factors are the decline in agricultural employment and the drop in the number of low-skilled jobs in industry--all caused in part by technological change and automation. Automation, among other things, has meant that many fewer workers are needed to oversee the physical processing of materials (formerly blue-collar jobs) but more are needed for preparatory work like programming (white-collar work).

In examining the impact of technological change and other factors, Killingsworth concludes that despite some exceptions, it seems justifiable to generalize that the displacement impact of structural change fell first at the bottom of the skill and educational attainment ladder but in more recent years has begun to reach into the middle levels. In a remarkably broad range of industries, the employment of higher-skilled nonproduction workers has grown while the employment of lower-skilled production workers has grown much more slowly or has actually declined.

According to Killingsworth, such trends have resulted in a steady worsening of the unemployment rates of the poorly educated. In 1950, the unemployment rate for men with less than five years of education was about four times the rate for male college graduates; by 1962, the rate for the less educated men was seven times that of the better educated. By taking into account the fact that when jobs of a certain type are not available people leave the labor market to enter into what economists call hidden unemployment, Killingsworth discovered that the unemployment rate among the least educated group was twelve times that of the college graduate. This trend also held true among groups in between the least and most educated males. Of particular interest is the high-school dropout. His real and official unemployment rate was 6.9 per cent in 1950. In 1962, his official unemployment rate was 7.8 per cent, while his real unemployment rate was 8.7 per cent.[21]

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[20] Charles C. Killingsworth, "Unemployment in the United States," Labor Forum Series, Voice of America, 1965.

Automation and the Rate of Unemployment

The evidence, thus, seems to relate education and skills with employment. The nature of the jobs growing steadily available tends to be of the type that requires a higher educational level. If one examines the unemployed, one sees that the less education an individual has the more likely he is to be among the unemployed. But has technological change and automation resulted in an overall increase in unemployment? Here the evidence is more difficult to find and there are varying points of view. Leon Keyserling, former head of the Council of Economic Advisors, claims that technological change is a cause of a high overall rate of unemployment.[22] Wolfbein estimates that in the decade of the 1960's 22 million jobs are going to be displaced by automation and technological change.[23] John I. Snyder, Jr., the late chairman and president of U. S. Industries and founder of the American Foundation on Automation and Employment, claimed that automation was eliminating 40,000 jobs a week.[24]

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[21] Killingsworth's ideas are discussed in greater length in the following: loc. cit.; "Structural Unemployment in the United States," Paper given at Conference on Employment Problems of Automation and Advanced Technology, International Labour Office, Geneva, July 20-24, 1964; and his "Unemployment After the Tax Cut," Statement for Joint Hearings, Senate Subcommittee on Employment and Manpower and House Select Committee on Labor, Washington, April 30, 1965; for similar points of view, see International Brotherhood of Pulp, Sulphite and Paper Mill Workers, Automation: Economic Implications and Impact Upon Collective Bargaining, June 1964, pp. 62-70; Statement by Richard H. Bolt, Associate Director of National Science Foundation, in Hearings before the Subcommittee of the Select Committee on Small Business, "The Role and the Effect of Technology in the Nation's Economy," 88th Congress, First Session, Part II, 1963, pp. 147-164.

Some observers explain what has happened. They contend that technological changes have helped bring about a drop in employment. The increased productivity and output, without a similar increase in demand, has resulted in the need for less employment. Sometimes the relationship between automation and unemployment is obvious, when the company immediately discharges workers or closes down the plant. Other times the relationship is less obvious. The companies do not lay off anyone; they just do not hire anyone and let attrition reduce their workforce. Meanwhile, high school graduates who normally would have found work at the company, find the employment doors closed. At other times, a company is forced to close down not because it has installed automated equipment but because its competitor has. Because of these facts, some economists have estimated the total net loss in employment, caused at least in part by technological change, in terms of two million jobs; others estimate 200,000 jobs--depending on how rapidly productivity increases as compared with the increases in demand for the products made.[25]

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[22] Leon Keyserling, "Economic Projects and Employment Prospects," Hearings before the Subcommittee on Employment and Manpower, "Nation's Manpower Revolution," 88th Congress, First Session, Part 5, 1963, pp. 1381-1386.

[23] Seymour L. Wolfbein, Statement in Hearings before Subcommittee of the Select Committee on Small Business, op. cit., pp. 232, 238-239. See also Ewan Clague and Leon Greenberg, "Employment," in Dunlop, op. cit., pp. 114-128; for organized labor's belief that automation and technological changes have resulted in a loss of many jobs, see summary, by industry and union, in Edward B. Shils, Automation and Industrial Relations, New York, Holt, Rinehart and Winston, 1963, pp. 136-142.

[24] John I. Snyder, Jr., Statement in Hearings before Subcommittee on Manpower and Automation, op. cit., p. 1650.

On the other hand, there are those who argue that the new technological changes will result in a net increase in employment. These changes, some say, destroy a number of jobs, but they also create new ones; they cause some industries to decline and perhaps die, but they also help some to be born and others to grow to maturity. Thus, these commentators believe that the short term result of automation may be a loss of some jobs, but in the long run employment will increase.[26]

There are, moreover, a number of writers who feel that automation is nothing new and that technological changes are not resulting in productivity increases that are much, if at all, greater than in the past. These persons argue that some jobs are disappearing because of machines but that increased demand for goods will create a concomitant demand for jobs, thereby causing technological unemployment to be only temporary. Thus, the Council of Economic Advisors of the President, making use of staff research reports, concludes that structural unemployment is no more a cause of unemployment than it was in earlier periods:

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[25] Ewan Clague, "Employment, Automation and Economic Growth in the United States," Paper for 13th International Conference of Gottlieb Duttweiler Institute for Economic and Social Studies, Zurich, Switzerland, July 6-9, 1964. Bok, *op. cit.*, p. 3; Leon Greenberg, "Technological Change, Productivity, and Employment in the United States," in *Manpower Implications*, pp. 9-11.

[26] Discussed in Edgar Weinberg, "An Inquiry into the Effects of Automation," *Monthly Labor Review*, January 1956, pp. 10-11; William G. Caples, "Automation in Theory and Practice," *Business Topics*, Autumn 1960, pp. 9-11; Robert W. Burgess, Director of the Bureau of the Census, Statement, in *Hearings* before the Subcommittee on Economic Stabilization of the Joint Committee on the Economic Report, 84th Congress, First Session, 1955, pp. 81-82; Malcolm L. Denise, "Automation and Unemployment: A Management Viewpoint," in Killingsworth, ed., *Automation*, *op. cit.*, pp. 90-92; for a discussion of the various points of view, see Buckingham, *op. cit.*, pp. 101-118 and Bureau of Employment Security, *Background Information on Impact of Automation and Technological Change on Employment and Unemployment*, U. S. Department of Labor, 1961, pp. 2-9.

> Studies of changes in the incidence of unemployment among unskilled and semiskilled blue-collar workers--whose jobs would seem to be highly vulnerable to technological change--can provide important insights into the structural unemployment problem. One would expect an accelerated rate of technological displacement to be reflected in rising rates of unemployment for these groups--relative to total unemployment. One would also expect to find such a relative rise for workers in industries such as manufacturing, mining, and transportation where automation has so far found its widest application.
>
> To test this possibility, we have correlated the unemployment rate in specific occupations and industries with the rate for all experienced workers in the labor force during the 1948-57 period--in other words, for the period before the main structural unemployment upsurge is alleged to have occurred. These correlations were then used to calculate what the occupational and industrial distribution of unemployment would have been in 1962 if the old relationships had held. If there had been a substantial increase in structural maladjustments, the actual 1962 unemployment rates for what we may call the "technologically vulnerable groups" should have been higher than these calculated rates. But in fact . . .a majority of the rates are lower . . . And taking all of the blue-collar occupations and goods-producing industries together, we also find that the rise in actual unemployment was somewhat less than the 1948-57 experience would have suggested.[27]

To this group of economists, the solution to the problem of unemployment rests on techniques that will increase demand for goods and thereby for jobs. This has been the main position of the Council of Economic Advisors. It is interesting, however, to note the following recommendation by the President in his *Report to the Congress* in 1965 which also reflects the Council's views. In his recommendations concerning "manpower policies for a flexible economy," President Johnson states:

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[27] Economic Report of the President, Washington, Government Printing Office, 1964, p. 176; Edwin L. Dale, Jr., "The Great Unemployment Fallacy," in Arthur M. Okun, ed., The Battle Against Unemployment, New York, W. W. Norton & Co., 1965, pp. 37-41; Walter W. Heller, "The Administration's Fiscal Policy," in Arthur M. Ross, ed., Unemployment and the American Economy, New York, John Wiley & Sons, 1964, pp. 93-115; J. M. Culbertson, Full Employment or Stagnation? New York, McGraw-Hill, 1964, pp. 55-57.

> Fiscal and monetary measures have the primary responsibility for furnishing "employment opportunities for those able, willing, and seeking to work."
>
> But the creation of jobs is not enough. Job opportunities and men must be matched. Workers must have the requisite skills and the opportunities to gain new skills if advancing technology finds less use for their old ones.[28]

The Council of Economic Advisors also recognizes technological change and favors a number of programs that would help raise the skill level of our society--something an increase in aggregate demand will not necessarily do.

Similarly, Arthur M. Ross, now Commissioner of Labor, points out that technological changes have always caused short-run unemployment. (He is unwilling to guess about the long-term effects.) He feels that what is different about the present situation is the great gap between the declining and the growing occupations. In earlier days, a displaced cotton farmer could work in a textile factory. But a displaced factory worker today cannot find work in our growing occupations--teacher, scientist or engineer. He states that "the problem of the convertibility of the labor force has become more serious than in any previous cycle of technological change."[29]

Ross also points to another difference between present and past reactions to automation and its effect on employment; namely, "our greater awareness of it," even if little in the way of action results from this awareness.[30]

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[28] *Economic Report of the President*, Washington, Government Printing Office, 1965, pp. 15 and 127-131.

[29] Arthur M. Ross, "Introduction: The Problem of Unemployment," in Ross, *op. cit.*, pp. 15-16.

Blum, in a similar comparison of the past and present, comes to similar conclusions. Americans have rejected the 19th century idea that society has no responsibility to cushion the impact of technological change; instead, they are committed to social action to help solve this problem, but what kind of social action remains unanswered:

> Americans are now more convinced than they were a century ago that the belief that technological unemployment will disappear without any social action is a false one. They believe that, as one economist put it, the only thing that we can be sure of in the long run is we will be dead. Americans further recognize that the effects of technological change on employment during the industrial revolution of the Nineteenth Century seem to have been turned upside down during the second industrial revolution of the Twentieth Century. Technological change during the Nineteenth Century forced many workers out of jobs immediately, though in the long run probably created many new jobs. Today, the impact of automation frequently seems to result in no immediate major unemployment. But it appears likely to result in a steady high rate of structural unemployment and, perhaps in the long run, sharply decrease the number of jobs available since it is affecting all aspects of our economy more deeply and at a more rapid rate than during the Nineteenth Century. To solve this problem requires a full-pledge program on the part of the government, labor and management.[31]

Automation and the Community

For any given community, the impact of automation and technological change differs. Some find themselves with a major problem as the building of an automated factory elsewhere destroys the need for a factory in a town and thereby wipes out a large number of jobs, causing a surplus of labor. Two students of this subject point out that "a significant proportion of the communities in the labor surplus areas can be traced directly to technological changes in several major industries, of which mining, textiles and railroad were most significant."[32]

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[30] Ibid., pp. 16 and 199-202.

[31] Albert A. Blum, "America's Reactions to Technological Change and Automation: A Comparative View," Management of Personnel Quarterly, Fall 1964, p. 16.

Communities, even when they are not harshly hit by automation, are often affected by it. There may be no large layoffs, but the new jobs that appear and the old ones that disappear may alter the social stratification in the community. Moreover, the developing new skills create a pressure on the community to train the young men with skills needed for the new jobs. The older worker, whose skills or jobs disappear because of automation, has different problems. Age is an obstacle in securing another job. But even if a worker secures another position, he often has to take a lower paying and less dignifying position with low morale attendant on his lower status.[33]

After analyzing many studies dealing with the impact of technological changes on those laid off in communities, Haber, Ferman, and Hudson conclude that:

1. Older workers find reemployment less readily than younger workers.
2. Displaced men obtain new jobs more quickly than displaced women because of differences in attachment to the labor force and because of certain disadvantages in hiring women, as seen by employers.
3. Displaced Negro workers are less likely than displaced white workers to find new jobs.
4. The less skilled workers find fewer job opportunities after job displacement than the skilled workers.
5. The less educated displaced workers find reemployment more difficult than the displaced workers with a higher level of education.

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[32] Sar A. Levitan and Harold L. Sheppard, "Technological Change and the Community," in Gerald G. Somers, Edward L. Cushman, and Nat Weinberg, eds., Adjusting to Technological Change, New York, Harper & Row, 1963, p. 160.

[33] Ibid., pp. 159-188; Daniel Bell, "The Post-Industrial Society," in Ginzberg, op. cit., pp. 50-51.

6. With some qualifications, displaced workers with high seniority fare no better in the job market than displaced workers with low seniority.

7. Most displaced workers obtain new jobs through informal rather than formal methods of job hunting.

8. The state employment service and private employment agencies play a minor role in finding jobs for displaced workers.

9. The number of reemployed workers who find jobs within a relatively short period after job termination depends upon circumstances and labor market conditions.

10. Many of the new jobs found by displaced workers are apt to be temporary and of short duration.

11. Displaced workers frequently have some knowledge of wages and working conditions before taking new jobs.

12. Displaced workers are frequently required to make an industry change when taking a new job.

13. Displaced workers become self-employed only in special instances.

14. The majority of displaced workers retain the same skill level or are upgraded when taking new jobs [although the internal evidence that the authors offer indicates that the second part of the statement is not true--for example, "Two out of every five reemployed workers are downgraded in skill level in taking new jobs."]

15. Many displaced workers must make an occupational change when taking a new job.

16. Many displaced workers receive reduced wages in taking new jobs.

17. Displaced workers who are reemployed usually consider these jobs to be less desirable than their old jobs.

18. Most displaced workers have a strong attachment to their communities, and little or no inclination toward looking for new jobs which would require them to move.[34]

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[34] William Haber, Louis A. Ferman, and James R. Hudson, *The Impact of Technological Change*, Kalamazoo, W. E. Upjohn Institute, 1963, *passim*.

These eighteen propositions are based upon an extensive study of the literature dealing with the host of problems that a community faces when technological change hits hard at its employment base. The studies already discussed indicate that society appears ready to take certain steps to cushion the impact of technological change and automation at least insofar as they affect jobs. But there appears to be no firm commitment or agreement concerning what should be done. One area, however, in which there is a general consensus that something should be done, is in the field of education. It is to education's role in cushioning the impact of technological change that we now turn.

Automation and Education

Charles Killingsworth sums up what he considers to be the basic outlines of a manpower policy. He believes:

> Three basic elements are required. The first is "salvage" programs, to provide basic skills to those already on the displacement scrap heap. The second element is "preventive maintenance" programs--that is, continuing education for those at all levels whose training and education are threatened with obsolescence. The third element is long-run development programs, to strengthen the effectiveness and the holding power of public education for the young. Each of these elements is a form of investment in human beings. In industry, investment cannot be stepped up without great increases in the production of machine tools. The essential "tools" for investment in human beings are highly-trained human beings. Until all of the implications of this fundamental truth are fully understood and acted upon by the U. S. authorities, unemployment and the tensions which it aggravates will be a growing menace within this great polity.[35]

Another leading student of the impact of technological change, Seymour L. Wolfbein, echoes Killingsworth's point of view. Wolfbein, after sketching in the impact of technological change, offers certain suggestions to those in the guidance profession:

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[35] Charles C. Killingsworth, "Structural Unemployment in the United States," Paper prepared for Conference on Employment Problems of Automated and Advanced Technology, International Labour Office, Geneva, July 20-24, 1964.

> 1. We must make a better match between the jobs we now have and will have and the people available to fill them. . . . In a free and democratic society, it is education, training, and retraining which traditionally act as the catalysts for effecting this match . . . .
>
> 2. Change. . . . will continue to be a surpassingly important dimension in the field of counseling. . . . Thus, we redefine our concept of the education and guidance process; to help the individual withstand the onslaughts and, in fact, take advantage of the inevitable changes which will occur in the world of work.
>
> 3. More specifically the aspiration, expectations, and goals of education and guidance need to be refocused. . . . We are only beginning to understand the nature of work and jobs under conditions of automation and technological change. The little evidence available points up the need, not for narrowly specialized individuals, but for those with the kind of learning experience that enables them to be as maneuverable, adaptable, and responsible as possible to emerging needs, many of which cannot be foretold under current conditions. This implies, more than incidentally, that the same high quality of flexibility and responsiveness is needed in the curricula offered and on the part of teachers and counselors as well. . . .
>
> 4. . . . Guidance is and must be a developmental process over the lifetime of the individual . . . .
>
> 5. Finally, the guidance professions must play a critical role in helping to increase and broaden the vocational pathways along which the students move . . . .[36]

What Wolfbein and Killingsworth are pointing out, and what other students of the subject also note, is that the school systems have to adapt themselves to the technology that is changing the jobs for which students in school are being trained; that since these jobs will also change when the boys and girls are in the labor market, the former students have to be able to develop new skills; and that this latter fact, plus the fact that some people already out of school are being displaced and need other qualifications, means that education must be a continuous process so that adults can also receive training.

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[36] Seymour L. Wolfbein, "Labor Trends, Manpower, and Automation," in Borow, op. cit., pp. 170-172.

Some authors have pointed to the interrelatedness of all of these processes. Thus, Blum and Schmidt have studied the problem of the Negro unemployed. They have related the large rate of adult and teenage Negro unemployment with the failure of the Negro children in the school system. They call for a massive retraining program for the adult Negro to take place in the schools so as to break down the unfavorable image adult Negroes have of the school systems and thereby, at the same time, improve the image their children have of places of learning. The adult Negroes' skills will be enhanced to make up for the original failure of the schools; the children's skills will be improved as they see that education is worthwhile. This becomes even more meaningful when one notes that the Negro unemployment rate is at its highest among Negro high-school dropouts. By this time, they are convinced education has no value for them.[37]

If the products of our school systems are not being trained to meet current or prospective job needs or if they drop out because of any number of reasons (among which one must include a recognition that much of their training appears to them, and in truth may be, a waste of time), these ex-students will be among the mass of our unemployed as dropout unemployment rates indicate. One author indicates the results:

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[37] 37. Albert A. Blum and Charles T. Schmidt, Jr., "Job Training Through Adult Education: The Negro and the Community's Second Chance," and Charles C. Killingsworth, "Negroes in a Changing Labor Market," both to be in Arthur M. Ross, ed., Poverty, Jobs and Color, New York, Harcourt, Brace and World, 1966.

> These adolescents would in the normal course join the untrained or poorly trained work force, a work force that will be more and more the repository of untrainable or untrained people displaced from their jobs by cybernation. These adolescents will have the following choices: they can stay in school, for which they are unsuited either by motivation or by intelligence; they can seek training that will raise them out of the untrained work force; they can compete in the growing manpower pool of those seeking relatively unskilled jobs; or they can loaf. If they loaf, almost inevitably they are going to become delinquent. Thus, without adequate occupational outlets for these youths, cybernation may contribute substantially to further social disruption.[38]

The author of this pessimistic projection of the educational problem offers a tentative solution:

> A constructive alternative, of course, is to provide appropriate training for these young people in tasks that are not about to be automated. But this implies an elaborate, costly program of research and planning to recruit teachers, to apply advanced teaching machine methods as a supplement to teachers, and to stimulate presently unmotivated youngsters to learn. The program would also require intensive cooperation among business, labor, education, local social service agencies, and the government. And all this must begin now in order for it to be ready when it will be needed. . . .
>
> Knowing what to teach will depend on knowing what types of jobs are likely to exist when the student finishes his training. This will require knowledge about the trends and plans of local industry, if that is where the youths are to work (and if that is where industry plans to stay!), and of industries in other localities, if the youths are willing to move. Such knowledge often does not exist in a rapidly changing world, or, if it exists, may not be forthcoming from businesses more concerned with competition than with the frustrated "delinquents" of their community. As of now, in the words of Dr. Conant, "unemployment of youth is literally nobody's affair."[39]

Though the education of your youth may be nobody's affair, surely many of the writers quoted in this chapter would like to make it somebody's affair. They point out that present employees tend to lack "basic qualifications,"[40] and that the schools have to provide them, as well as provide retraining for the adults. Thus, Ginzberg reports that many of the studies of retraining indicate that companies will not retrain employees who do not have adequate basic training. For example, many maintenance jobs in automated plants require some knowledge of mathematics, physics, and electronics. If a production worker does not have such skills, he will not be transferred to such a job, for training would be too expensive. As a result, many production workers feel they will find such good jobs "limited, almost like hen's teeth." But others disagree, claiming it is a matter of the individual worker and "in large part, their educational background."[41]

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[38] Michael, *op. cit.*, pp. 22-23.
[39] *Ibid.*, pp. 23-24.

But whether the new jobs require more or less skill, Ewan Clague states that:

> A good background is becoming more essential, even for those in the least skilled jobs, in order to enable the individual workers to make frequent shifts as technological and other factors increase the tempo of industrial change. This is true, not so much because the duties performed in these occupations require more skill than they did a decade or two ago, but because in our rapidly changing economy, workers in these types of jobs are faced with frequency of change. . . . Employers prefer the worker who can not only perform the immediate job, but who can learn quickly to operate new equipment. . . . The young man who can read a bill of lading, follow instructions for loading a truck, use judgment on size of loads. . . . will surely be a good candidate for operator of a forklift or other mechanized equipment when it is introduced by his employer. On the other hand, the laborer who has only strength to offer is likely to join the ranks of the unemployed when mechanized equipment takes over material movement.[42]

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[40] Beaumont and Helfgott, op. cit., p. 139.

[41] Eli Ginzberg, "The Sixties--Manpower Horizons--Machines Versus Men?" in Selected Readings, p. 463.

[42] Ewan Clague, "Effects of Technological Change on Occupational Employment Patterns in the United States," in Manpower Implications, pp. 37-38.

In addition, Clague points out that more employers are requiring a high school diploma for jobs that formerly required less education. And those jobs that require more education are increasing more in our labor market than those which require less education.[43]

It is for all of these reasons that the writers studied argue that educational changes have to be part of an overall manpower policy. Haber puts it this way:

> The country sorely needs a national manpower program . . . The heart of such a program must be full employment, however it is defined. . . . Our manpower resources cannot be neglected: millions left without adequate basic education; many ill-equipped for the occupational requirements of these times and without proper counseling and direction.[44]

The education of the youths must be meshed with the training and retraining of the adults, which must be meshed with the occupational needs of today, which must be meshed with the qualifications of workers flexible enough for a changing work force of tomorrow, so argue the writers on automation. Automation involves the intricate working together of many parts of a machine, and the engineers appear to have managed satisfactorily to mesh them together. A similar task remains with those concerned with the human beings affected by such changes.[45]

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43. Ibid., p. 38.

44. William Haber, "Next Steps in Labor Market Policy," in Ross, op. cit., pp. 52-53.

45. Shils, op. cit., pp. 265-293; U. S. Department of Labor, Manpower Research Bulletin No. 3, "Young Workers: Their Special Training Needs," Office of Manpower, Automation and Training, May 1963; U. S. Department of Labor, Manpower Research Bulletin No. 1, "Mobility and Worker Adaptation to Economic Change in the United States," Office of Manpower, Automation and Training, July 1963, pp. 33-40; Edgar Weinberg, "An Inquiry into the Effects of Automation," Monthly Labor Review, January 1956, pp. 12-14; New York State Department of Labor, Jobs, 1960-1970: The Changing Pattern, Albany, State Office Building, 1960, pp. 19-31; Manpower Report of the President, Washington, Government Printing Office, 1965, pp. xi-xiv, 40-41. In pages 91-95, the President calls for four things: "strengthening of pre-school and elementary and secondary education;

...extension of free public education for two years beyond high school; ...financial assistance to college and university students; ...enlarged opportunities for training and retraining of unemployed workers." In pages 97-109, he discusses vocational education, and suggests the following needed steps: "rapid progress...in planning and setting up special programs for disadvantaged youths; ...rapid expansion of technical education and other postsecondary programs; ...close meshing of high-quality vocational education with changing job market needs; ...recruiting enough well-qualified teachers and progressively improving the quality of instructional programs."

Chapter 3

THE STUDY PLAN

The purported outcome of this pilot project was the development of a detailed plan for an intensive study of automation and its implications for education in a metropolitan area. The proposed study plan is presented as follows:

1. A study outline in its entirety to give the readers an overview of the scope of the proposed study.
2. A detailed consideration of each aspect of the study, including the specific questions to be answered, the data to be collected or derived to answer the questions, the sources of the data including the design of the data--collection instruments required, and proposed analyses of the data. (Instruments for collecting the necessary data, such as questionnaires and interview guides, are referred to in the discussion but are placed in the Appendix of the report.)

Scope of the Study

Four major facets of investigation are included in the proposed study. First is a consideration of basic background information on the metropolitan area. These background data include information on (a) the population of the area, (b) the nature, composition, and distribution of the labor force, (c) employment, and (d) unemployment. The second facet of the study will attempt to secure more specific data on the extent to which area industries are automating, the nature of automated jobs in the area, and the educational and training requirements of these automated jobs. In the light of the information on the background and the extent and effect of automation, data will then be collected on the present elementary, secondary, and out-of-school youth and adult programs and personnel, and other opportunities for vocational and technical education in the metropolitan area. The final portion of the study will be devoted to a consideration of the changes in the program of education which are dictated by the changing requirements of automation. The scope of the proposed study follows:

The Environment of Automation

- I. The population of the area
  - A. Past, present, and projected total population
  - B. The components of population change
    - 1. Natural increase
    - 2. Effect of migration
    - 3. Changes by age, sex, and race.
- II. Nature, composition, and distribution of the labor force
  - A. The total labor force of the area
    - 1. Size and growth of the total labor force
      - a. Compared with total population of the area
      - b. Compared with various regions of which the area is a part--the United States, the East South Central States, Tennessee, and Middle Tennessee--and with selected metropolitan areas
    - 2. Sex composition of the total labor force of the area
      - a. Percentage of women in the labor force as compared to other regions of which the area is a part
      - b. Labor force participation rates of the population by sex for the area and for the United States
    - 3. Age composition of the total labor force of the area
      - a. Percentage distribution of the labor force by age group
      - b. Comparison of distribution of labor force by age with distribution of population by age
    - 4. Racial composition of the total labor force
      - a. Composition of total labor force by race
      - b. Composition of total population by race
  - B. Employment in the Nashville-Davidson County Metropolitan Area
    - 1. Employment growth

- a. Total employment compared to total population
- b. Growth of employment compared to growth of population

2. Occupational patterns
   - a. Distribution of total employment by major occupation groups
   - b. Comparison of percentage distribution of total employment by major occupation groups in the area with various regions of which the area is a part and with selected metropolitan areas
   - c. Employment changes by major occupation groups

3. Industry patterns
   - a. Total employment by major industry groups in the area
     - (1) Number and percentage distribution of employment by major industrial groups
     - (2) Comparison of total employment by major industry groups with employment by major industry groups in various regions of which the area is a part, and in selected metropolitan areas
     - (3) Manufacturing employment compared to trade and services employment by major industry groups
   - b. Employment changes by major industry groups
     - (1) Number and percentage of change in employment by major industrial groups
     - (2) Comparison of employment changes by major industry groups with various regions of which the area is a part, and with other selected metropolitan areas
     - (3) Changes in number of jobs per 1,000 population by industry group in various regions of which the area is a part, and in selected metropolitan areas

C. Unemployment in the Nashville-Davidson County Metropolitan Area

1. Number and rate of unemployment in civilian labor force in various regions of which area is a part, and in selected metropolitan areas
2. Unemployment by sex--comparative data with various regions and selected metropolitan areas

3. Unemployment by race--comparative data with various regions and selected metropolitan areas
4. Age distribution of the unemployed
5. Unemployment by occupation
6. Other characteristics of the unemployed
   a. Educational level
   b. Average duration of unemployment
   c. Previous industry employment
   d. Willingness to take training
   e. Willingness to relocate
   f. Income of unemployed
      (1) Unemployment insurance coverage
      (2) Amount of benefits
      (3) Duration of benefits
      (4) Public assistance
7. Factors contributing to employment stability in the area
8. Factors contributing to employment instability

D. Employment utilization of special problem groups
   1. The school dropout
   2. The noncollege-bound youth
   3. Minority groups
   4. The handicapped
   5. The aged

E. Area programs to bring the worker and the job together
   1. Tennessee State Employment Service
   2. Private employment agencies
   3. Trade unions

4. Schools
5. Welfare and civic organizations

The Extent and Effect of Automation

III. The present manpower needs of the area
  A. Additional workers needed in each job classification to meet current needs
  B. Job classifications in which employers are experiencing difficulty in securing qualified workers

IV. The future manpower needs of the area
  A. Employer estimates of needs five years hence, by job classification
  B. Employment projections by occupation and by industry for the area
    1. Analyze historical data for trends
    2. Project the basic trends
    3. Analyze data to gain an understanding of forces which produced trends
    4. Make judgment as to likelihood of the persistence of identified trends

V. The nature of automated jobs in the metropolitan area and their educational and training requirements
  A. Specific instances of automation in offices and industries
  B. Number of employees in specific offices and industries before and after automation
  C. Training of employees employed before automation compared with training of employees employed after automation
  D. Retraining programs in specific offices and industries automating
  E. Types of skills required for employment in automated offices and industries
  F. Sources of training for skills needed and cost of such training

The Present Program of Education in the Area

VI. The elementary school program

- A. Enrollment, by grade, trends and projections
- B. The general curriculum and basic skills
- C. The special curriculum
- D. Learning aids, teaching materials, and supplies provided
- E. Pupil personnel services provided
  - 1. Health services
  - 2. Food services
  - 3. Attendance services
  - 4. Guidance services, follow-up, referrals
  - 5. The research program
- F. The professional personnel
  - 1. Distribution by position, age, sex, and marital status
  - 2. Their professional qualifications
    - a. College training--amount and recency
    - b. Experience
    - c. Assignments compared to college major field
    - d. Professional activities
  - 3. Conditions under which they work
    - a. Teaching load
    - b. Economic and security factors
    - c. Morale factors
  - 4. Teacher turnover
    - a. Extent of turnover
    - b. Reasons for leaving
    - c. Where they go after leaving teaching

G. Measures of program outcomes

1. Promotion and retention practices
2. Extent of pupil retardation
3. The effectiveness of curriculum and teaching as revealed by the achievement of students as measured by standardized achievement tests
4. The nature of the pupil population as revealed in standardized tests estimating scholastic aptitude
5. Curriculum areas needing attention as revealed by an item analysis of achievement test results

VII. The secondary school program

A. Enrollment, by grade, trends, and projections

B. The general curriculum

1. Courses offered, by school
2. Pupil enrollments, by courses

C. The vocational curriculum--courses offered, pupils enrolled

1. Agricultural education by school
2. Trade and industrial education
    a. Preparatory programs
    b. Cooperative programs
3. Home economic education
4. Distributive education
5. Practical nursing and other health occupations
6. Area technical education programs

D. Extraclass activities provided

E. The professional personnel

1. Distribution by position, age, sex, and marital status
2. Their professional qualifications

- a. College training--amount and recency
- b. Experience
- c. Assignment compared to college major field
- d. Professional activities

3. Conditions under which they work
    - a. Teaching load
    - b. Economic and security factors
    - c. Morale factors
4. Teacher turnover
    - a. Extent of turnover
    - b. Reasons for leaving
    - c. Where they go after leaving teaching

F. Pupil services provided

G. The dropout problem

1. The extent of the problem
2. The personal characteristics of the dropouts
    - a. Age
    - b. Sex
    - c. Mental maturity
    - d. Race
3. The academic characteristics of the dropout
    - a. Grade
    - b. Academic retardation
    - c. Record of extraclass activities
    - d. Record of absences
4. Family data

- a. Educational attainment of parents
- b. Other sibling dropouts in same family

5. Reasons for dropouts
   - a. Students' evaluation of reasons
   - b. Schools' evaluation of reasons

H. Measures of program outcomes

1. Extent of pupil retardation
2. The effectiveness of curriculum and teaching as revealed by the achievement of students as measured
3. The nature of the pupil population as revealed in standardized tests estimating scholastic aptitude
4. Curriculum areas needing attention as revealed by an item analysis of achievement test results

VIII. The public school vocational program for out-of-school youth and adults--scope and enrollments

A. Agricultural education

1. Young farmer programs
2. Adult farmer programs

B. Trade and industrial education

1. Out-of-school youth and adults: apprentices in related instruction
2. Out-of-school youth and adults: occupational extension programs

C. Home economics education--evening classes for employed persons

D. Distributive education--extension programs

E. Practical nursing and other health occupations

F. Area technical education programs

G. Area Redevelopment and Manpower Development projects

IX. Other opportunities for vocational and technical education in the metropolitan area

   A. Programs in higher education

   B. Programs of business and industry

   C. Apprenticeship programs

   D. Proprietary schools

   E. Programs of organized labor

Implications for Changes in Program of Education in the Area

X. The elementary school program

   A. Changes needed in scope of program

   B. Improvements needed in instructional staff

      1. Qualifications

      2. Stability

      3. Working conditions

   C. Additional pupil services needed

XI. The secondary school program

   A. Changes needed in scope of general curriculum

   B. Need for improving and redirecting vocational education in the high schools

      1. Need for making program available to more students

      2. Adequacy of specialized vocational schools

      3. Design of basic vocational education programs

      4. Changes needed in existing programs to bring them more nearly in accord with present needs

      5. Need for work-study programs

- C. Improvements needed in instructional staff
    - 1. Qualifications
    - 2. Stability
    - 3. Working conditions
- D. Additional pupil services needed
- E. Improving the guidance programs and counseling services
- F. Action programs needed to coordinate better the schools and employment services
- G. Responsibility of high school for entry job placement

XII. Education beyond the high school

- A. Need to improve and redirect vocational and technical education beyond the high school
- B. Evaluation of present quality standards for vocational and technical education beyond the high school in the area
- C. Need to expand training opportunities for out-of-school youth and adults
    - 1. Developing programs to adjust the skills of the labor force to changing needs of the economy
    - 2. Increasing the number of occupations for which training is provided
- D. Improvements and expansion needed in apprenticeship programs
    - 1. Ways to encourage apprenticeship training for both traditional and other occupations by labor, management, and schools
    - 2. Possibilities for using joint apprenticeship committees, representing management and labor, to work with the schools to develop educational policy, approve related instruction and course content, and to evaluate programs

XIII. The responsibility of institutions of higher education

- A. Need for institutions of higher education to assume a greater responsibility for the education of youth and adults for occupational competence in the technical and highly skilled occupations at the less-than-baccalaureate level

B. Need for two-year colleges in area to make vocational and technical education programs a major part of their mission and a fundamental institutional objective

C. Desirability of joint planning between the divisions of colleges and universities preparing people in the professional fields and post-high-school institutions preparing technical and semi-professional personnel

D. Need for administrators and faculties of colleges and universities joining with institutions offering occupational education at the less-than-baccalaureate level through areawide planning, research assistance, faculty loans and exchange, use of facilities, and such other efforts as will assist in the development of post-high-school programs of vocational and technical education

E. Ways to use leadership and special assistance from the various divisions of the colleges and universities in aiding the establishment of new, comprehensive, two-year institutions

XIV. Serving youth and adults with special needs

A. Special assistance programs needed for school dropouts

B. Problems in retraining the unemployed

C. Programs for the handicapped

D. Retraining the older citizen for employment

XV. Ways to expand and improve employment services

XVI. Mobilizing community resources to attack problems created by automation

The Study Procedures

This section of the report contains a detailed outline of the study procedures. These procedures include the specific questions to be answered, the data to be collected to answer the questions, the sources of the data including the design of any data-collection instruments required, and the proposed analyses of the data. The outline follows:

The Environment of Automation

I. Population trends in the area

Data to be collected or derived

1. Population of the area--1940, 1950, and 1960
2. Population estimates for the area--1965, 1970, and 1975
3. Population change, natural increase and net migration, 1940-1950 and 1950-1960
4. Distribution of the population by age and sex--1940, 1950, 1960, and estimates for 1965, 1970, and 1975
5. Components of population change by age groups, 1950-1960
6. Net migration by age-sex-race groups, 1940-50 and 1950-60

Sources of data and methodology

1. The population count for 1940, 1950, and 1960 will be tabulated from the U. S. Census of Population adjusted for underenumeration and age misstatements (see Population Report Series P-25, Nos. 98 and 170).
2. Three methods will be used to estimate the area population. The first method is as follows:
    - a. Separate 1960 population into age-sex-race groups
    - b. Estimate births by sex-race for the 1960-64, 1965-69, and 1970-74 periods
    - c. Multiply each population and birth group by a ratio which reflects the estimated mortality and net migration experience of the group from 1960 to the estimate date

d. Determine ratio multipliers as follows: Three sets of life table survival rates will be used; one for 5 years, one for 10 years and one for 15 years. Each rate will be added to a corresponding net migration rate from three sets of net migration rates based on the net migration experience from 1950 to 1960 of 1950 age-sex-race groups to obtain the three sets of multipliers

e. Add resulting products for each group for 1965, 1970, and 1975 for the first estimates of future population

f. Estimate the births used in this method by projecting the age-sex-race specific birth rates for 1949-51 and 1959-61 along a straight line to 1965, 1970, and 1975 and by applying these rates to an estimated weighted female population age 15-44 years in 1970 and 1975. The weighted female age groups will be derived from the estimated 1970 and 1975 female age groups, which were obtained by applying the multipliers calculated above to the females age 0-34 years in 1960.

For the second method of population projection, a proportional growth is assumed for the area just as the growth proportion from 1950 to 1960 (i.e. the 1970 population is to the 1960 population as the 1960 population is to the 1950 population). Estimates for 1965 and 1975 are assumed to be on a straight line passing through the ordinates of the 1960 population count and the 1970 estimated population.

The third method of projection assumes that the 1965, 1970, and 1975 estimates are on the straight line passing through the ordinates of the 1950 and 1960 population counts.

3. In estimating the natural increase in population by decade, the population at the beginning of the decade and the births (adjusted for underenumeration) during the decade will be discounted by appropriate Life Table Survival Ratios. The population will be separated into 5-year age groups by color and sex and a hypothetical estimate of the population by age groups at the end of the decade, assuming no migration, will be obtained. The age groups will then be summed and the population at the beginning of the decade subtracted from the total. The result will be the estimate of natural increase.

4. Net migration by age-sex-race group will be obtained by subtracting the estimates for the 1950 and 1960 age groups (excluding migration) from the appropriate age groups of the 1950 and 1960 population respectively. The total net migration is the algebraic sum of the net migration by age groups. The following formula which treats total migration as a residue will be used as a computational check:

$$M_d = (P_e - P_b) - N_d$$

where M_d = total net migration over the decade under consideration,

P_e = population at the end of the decade,

P_b = population at the beginning of the decade,

and N_d = natural increase over the decade.

Proposed analyses

1. Population of the area--1940, 1950, and 1960 and estimates for 1965, 1970, and 1975
2. Area population change, natural increase and net migration--1940-50 and 1950-60
3. Relative distributions of area population, by age and sex--1940, 1950, and 1960 and estimates for 1965, 1970, and 1975
4. Area population change from 1950 to 1960 due to deaths, births, and migration, by age groups, shown as a percentage of the total change in population from 1950 to 1960
5. Area net migration, by age-sex-race group, shown as a percentage of net total migration--1940-50 and 1950-60

II. The nature, composition, and distribution of area labor force.

Data to be collected or derived

1. Area total labor force--1940, 1950, and 1960
2. Estimates of area total labor force--1965, 1970, and 1975
3. Total labor force of the United States, East South Central States, Tennessee, and Middle Tennessee--1950 and 1960
4. Relative age distributions of the area labor force, by sex--1940, 1950, and 1960

5. Estimates of age distributions of the area labor force, by sex--1965, 1970, and 1975
6. Distribution of labor force in United States, by age group--1960
7. Number of women in the labor force of Tennessee, East South Central States, and the United States--1940, 1950, and 1960
8. Area labor force participation rates, by age and sex--1940, 1950, and 1960
9. Estimates of area labor force participation rates, by age and sex--1965, 1970, and 1975
10. Labor force participation rates, by sex, for the United States--1950 and 1960
11. Composition of the area total labor force, by race--1940, 1950, and 1960

Sources of data and methodology

1. Area labor force--1940, 1950, and 1960: Age-sex participation rates from the U. S. Census of Population will be applied to the corresponding age groups of the relevant adjusted population. The labor force by age groups will be summed to obtain the total labor force.
2. Area labor force--1965, 1970, and 1975 (Estimate A): Age-sex participation rates will be projected along a straight line from their 1950 and 1960 values to 1965, 1970, and 1975. The projected rates will be applied to the adjusted population by age-sex group and the results will be summed to obtain the total labor force.
3. Area labor force, 1970 (Estimate B): The age-sex participation rates obtained in Estimate A will be averaged with the corresponding 1960 age-sex group to produce a new set of rates. The labor force will be estimated using these rates as in Estimate A.
4. Estimated number of 18 year olds, 1960-70 period: The 18-year-old population in April 1960 will be divided by the approximate number of births from April 1941 to April 1942 to determine a ratio which measures the change in number of this birth group after 18 years. The births in the sixteen yearly periods beginning with January 1941-January 1942 will be discounted by this ratio to estimate the 18 year olds in 1960, 1961....1975.

5. Labor force of the United States, East South Central States, Tennessee, and Middle Tennessee--1950 and 1960: U. S. Census of Population: 1950; and U. S. Census of Population: 1960, General Social and Economic Characteristics, Final Reports PC (1)-1C.

6. Women in labor force in Tennessee, East South Central States and the United States--1940, 1950, and 1960: Sixteenth Census of the United States: 1940; U. S. Census of Population: 1950; and U. S. Census of Population: 1960.

7. Labor force participation rates, by sex, for the United States--1950 and 1960: U. S. Census of Population: 1950 and U. S. Census of Population: 1960.

8. Distribution of United States labor force, by age group--1960: U. S. Census of Population: 1960.

Proposed analyses

1. Comparison of area total labor force with area total population--1940, 1950, and 1960 and projected for 1965, 1970, and 1975

2. The labor force of the area shown as a percentage of the labor force of the United States, East South Central States, Tennessee, and Middle Tennessee--1950 and 1960

3. Relative age distributions of the area labor force, by sex--1950 and 1960 and estimates for 1965, 1970, and 1975

4. Area labor force participation rates, by age and sex--1950 and 1960 and estimates for 1965, 1970, and 1975

5. Comparison of the percentage of women in the area labor force with percentage in labor force in Tennessee, East South Central States, and the United States--1940, 1950, and 1960

6. Comparison of the labor force participation rates of the population fourteen years and over, by sex, in the area and in the United States--1950 and 1960

7. Comparison of the percentage distribution of the labor force, by age group, in the area and in the United States--1960

8. Composition of the area total labor force, by race--1940, 1950, and 1960

9. Composition of the area total population, by race--1940, 1950, and 1960

III. Employment in the area

Data to be collected or derived

1. Total employment in the area--1940, 1950, and 1960
2. Distribution of total employment of area by major occupation groups--1940, 1950, and 1960
3. Total employment, by major occupation groups, in Tennessee, East South Central States, and the United States--1960
4. Employment changes in area, by major occupation groups--1940 to 1950 and 1950 to 1960
5. Total employment in area, by major industry groups--1940, 1950, and 1960
6. Employment changes in area, by major industry groups--1940-1950 and 1950-1960
7. Total employment, by major industry groups, in the United States, East South Central States, Tennessee, and selected standard metropolitan statistical areas--1960
8. Estimates of annual average nonagricultural employment in area, by industry--1964 to 1970 and 1964 to 1975
9. Seasonal index of nonagricultural employment in area--1949 to 1962

Sources of data and methodology

1. Data on total employment, employment by occupation, and employment by industry groups in the area, Tennessee, East South Central States, the United States, and selected standard metropolitan statistical areas will be derived from the U. S. Census of Population for the respective years.
2. Nonagricultural employment projections to 1970-1975: Two sets of projections of the nonagricultural employment in the area will be made to 1970 and 1975. These projections will give industry group projections for subgroups of the manufacturing and trade industry divisions as well as other divisions of industry. The first set of projections will use the average yearly ratios of change of annual average employment over the longest period for which data is available from Tennessee State Department of Employment Security. This is the fifteen-year period from 1949 through 1964. The second set of projections will use the average ratios of change for the seven-year period from 1949 through 1964.

3. **Seasonal index of nonagricultural employment--1949-1962:** Twelve average monthly values will be computed for the period. A straight-line trend will be fitted to the averages using the least squares method. The index values will be computed by dividing the average monthly values by the corresponding trend values.

Proposed analyses

1. Comparison of total employment of area to total population--1940, 1950, and 1960
2. The number and percentage distribution of the total employment of the area by major occupational groups--1940, 1950, and 1960
3. Comparison of the percentage distribution of total employment by major occupation groups, in the area, Tennessee, East South Central States, and the United States--1960
4. Employment changes in area, by major occupation groups, shown in terms of increase in number employed and per cent of increase--1940 to 1950 and 1950 to 1960
5. Total employment in area by major industry groups--1940, 1950, and 1960
6. Percentage distribution of employment in area by major industrial groups--1960
7. Comparison of manufacturing employment with trade and services employment in area by major industry groups--1940, 1950, and 1960
8. Employment changes in area by major industry groups, shown in terms of increase in number employed and per cent of increase--1940 to 1950 and 1950 to 1960
9. Comparison of change in number of jobs per 1,000 change in population in area and in Tennessee--1950 to 1960
10. Total number employed and percentage distribution of total employment by major industry groups in East South Central States--1950 and 1960
11. Comparison of total employment by major industry groups with population change in East South Central States--1950 to 1960
12. Comparison of change in number of jobs per 1,000 change in population in area and in East South Central States--1950 to 1960

13. Comparison of total population, total employment, employment by major industry groups in area, in selected standard metropolitan statistical areas and in the United States--1960

14. Comparison of number employed for each 1,000 total employment and for each 1,000 total population in the area, in selected standard metropolitan statistical areas and in the United States in 1940, 1950, and 1960 in each major industry groups

15. Projections of annual average nonagricultural employment in area by industry groups, from 1964 to 1970 and from 1964 to 1975

16. Seasonal index of nonagricultural employment in the area--1949 to 1962

IV. Unemployment in the area

Data to be collected or derived

1. Number unemployed and rate of unemployment in labor force in area--1940, 1950, and 1960
2. Number unemployed and rate of unemployment in labor force in Tennessee--1940, 1950, and 1960
3. Number unemployed and rate of unemployment in labor force in East South Central States--1940, 1950, and 1960
4. Number unemployed and rate of unemployment in labor force in the United States--1940, 1950, and 1960
5. Unemployment rate, by sex, in the area--1940, 1950, and 1960
6. Unemployment rate, by sex, in Tennessee--1940, 1950, and 1960
7. Unemployment rate, by sex, in East South Central States--1940, 1950, and 1960
8. Unemployment rate, by sex, in the United States--1940, 1950, and 1960
9. Unemployment rate, by race, in the area--1940, 1950, and 1960
10. Unemployment rate, by race, in Tennessee--1940, 1950, and 1960
11. Unemployment rate, by race, in East South Central States--1940, 1950, and 1960
12. Unemployment rate, by race, in the United States--1940, 1950, and 1960

13. Number unemployed and rate of unemployment in area by major occupation groups--1960

14. Rate of unemployment by sex and race in selected standard metropolitan statistical areas--1960

15. Educational level of area labor force unemployed during 1965

16. Average duration of unemployment in area during 1965

17. Data on income of the area's unemployed during 1965

    a. Unemployment insurance coverage

    b. Amount of benefits

    c. Duration of benefits

Sources of data and methodology

1. Data on the number unemployed and rate of unemployment in the labor force in the area, Tennessee, the East South Central States, the United States, and selected standard metropolitan statistical areas for 1940, 1950, and 1960 will be derived from the U. S. Census of Population for the respective years.

2. Data on the educational level of the unemployed, the average duration of unemployment, and the income of the unemployed during 1965 will be tabulated from the records of the Tennessee State Department of Employment Security.

Proposed analyses

1. Comparison of total unemployment and rate of unemployment in the area, Tennessee, the East South Central States, and the United States--1940, 1950, and 1960

2. Comparison of the unemployment rate by sex in the area, Tennessee, the East South Central States, and the United States--1940, 1950, and 1960

3. Comparison of the unemployment rate by race in the area, Tennessee, the East South Central States, and the United States--1940, 1950, and 1960

4. Number unemployed, percentage distribution of unemployment, and rate of unemployment by major occupation groups in the area--1960

5. Comparison of the rate of unemployment by sex and race in the area and selected standard metropolitan statistical areas--1960

6. Distribution of unemployed in the area during 1965 by level of educational training

7. Average duration of unemployment of area labor force unemployed during 1965

8. Income of unemployed during period of unemployment in 1965

V. Unemployed out-of-school youth in the area

Data to be collected or derived

1. Extent of unemployment among out-of-school youth, 16-21 years of age

2. Data essential to determining a description of the unemployed youth in terms of:

   a. Level of education

   b. Duration of time out of school

   c. Attitude toward returning to school for training

   d. Marital status

   e. Post military experience

   f. Past full-time employment

Sources of data and methodology

1. Data will be collected by means of a survey conducted by personal interview.

2. The residential areas to be surveyed will be those areas where it is felt that the unemployed, out-of-school youth problem can be found in its maximum form. The areas selected will be those characterized by:

   a. High rate of public assistance

   b. High crime and delinquency rate

   c. High dropout rate

   d. High rate of unemployment

   e. Deteriorating housing units

3. A survey of the total youth population, ages 16-21, within the selected residential areas will be attempted.

3. A closed-end questionnaire will be used by the interviewers. (See Instrument A, Appendix)

4. The responses to the questionnaire will be recorded on standard machine punch cards and compiled by mechanical sorting.

Proposed analyses

1. Number and percentage of youth unemployed by residential area
2. Number and percentage of youth unemployed by sex
3. Number and percentage of youth unemployed--high school graduate or nongraduate
4. Comparison of youth unemployment rates by race
5. Number and percentage of unemployed who have held a full-time job
6. Number and percentage of unemployed high school graduates who have held a full-time job
7. Number and percentage of unemployed nongraduates who have held a full-time job
8. Age distribution of unemployed youth
9. Number and percentage of unemployed youth who have been out of school two or more years
10. Number and percentage of unemployed youth who feel they could get a job if they could get training in a school
11. Number and percentage of unemployed youth by sex expressing a desire to return to school for specific training
12. Marital status of unemployed youth by sex
13. Number and percentage of unemployed youth who have been in the armed service, by sex
14. Specific areas of training desired by the youth expressing a desire for additional training

VI. Employment utilization of the noncollege-bound youth

Data to be collected or derived

1. Opinions of employers on the occupations in the area which offer the best employment opportunities to noncollege-bound high school graduates

2. Data on the extent to which employers prefer that high schools train their graduates in job skills

3. Data on the extent to which area employers are requiring high school graduation as a prerequisite for employment

4. Data on extent to which employers are providing on-the-job training for beginning employers

Sources of data and methodology

1. Officials of the local office of the Tennessee State Department of Employment Security will be asked to compile a list of the area firms employing noncollege-bound high school graduates.

2. Instrument B, (see Appendix) will be distributed to the director of personnel of each firm in the compiled list.

3. The recorded responses from the directors of personnel will be analyzed by frequency distribution count in order to determine the occupations which offer best employment opportunities to noncollege-bound high school graduates.

4. Frequency counts of responses and percentage measures will be used to determine the extent to which area employers require high school graduation as a prerequisite for employment, the extent to which employers prefer that high schools train their graduates in job skills, and the extent to which employers are providing on-the-job training for beginning employees.

Proposed analyses

1. Leading employment opportunities for area noncollege-bound high school graduates as ranked by area employers--1965

2. Number and percentage of employers providing on-the-job training for beginning employees in each of the leading employment areas for noncollege-bound high school graduates

3. Number and percentage of employers preferring that high schools train graduates in job skills in each of the leading employment areas for noncollege-bound high school graduates

4. Ranking of leading employment opportunities for noncollege-bound high school graduates by extent to which high school graduation is a prerequisite to employment

VII. Area programs to bring the worker and the job together

Data to be collected or derived

1. Number of job placements made in area by the Tennessee State Employment Service--1960 to 1965
2. Number of job placements made in area by private employment agencies--1960 to 1965
3. Number of job placements made in area by trade unions--1960 to 1965
4. Number of job placements made in area by schools and colleges--1960 to 1965

Sources of data and methodology

1. Data will be collected through means of a questionnaire survey.
2. Instrument C (see Appendix) will be administered to the appropriate officials of the Tennessee Department of Employment Security, each trade union, each private employment agency, each public and private high school, college, business or trade school, and other proprietary schools.

Proposed analyses

1. Distribution of job placements made by Tennessee State Employment Service in area by industry classification and by occupation--1961, 1962, 1963, 1964, and 1965
2. Distribution of job placements made by private employment agencies in area by industry classification and by occupation--1961, 1962, 1963, 1964, and 1965
3. Distribution of job placements made by trade unions in area by industry classification and by occupation--1961, 1962, 1963, 1964, and 1965
4. Distribution of job placements made by schools and universities in the area by industry classification and by occupation--1961, 1962, 1963, 1964, and 1965
5. Comparative use of potential sources of employee recruitment by area employers--1965

The Extent and Effect of Automation

VIII. Manpower and training needs of the area

Data to be collected or derived

1. Nonagricultural employment, by occupation, as of current month
2. Additional workers needed, by occupation, to meet current needs
3. Number of employees that employers expect to employ in each occupation in January 1968 and January 1970
4. Employer estimates of manpower replacement needs in each occupation--January 1966 to January 1968 and January 1966 to January 1970
5. In-plant trainees who will be completing training in each occupation during forecast period
6. Net training needs in each occupation

Sources of data and methodology

1. Data relating to manpower and training needs of the area will be secured through means of a questionnaire survey of the leading employers of the area. (See Instrument D, Appendix)
2. Employers will be requested to state the number of employees they need to employ presently, in January 1968 and in January 1970. They will be asked to assume that economic conditions at the time of the survey will continue without significant change throughout the forecast period. They will be asked to base their forecasts of manpower requirements upon their current normal work week and to assume that adequate supplies of labor and materials will be available. In addition, employers will be asked to estimate replacement needs during the forecast period and the number of in-plant trainees who will be completing training during the forecast period.
3. Net training needs in each occupation will equal the growth needs, plus the replacement needs, minus the in-plant trainees completing training.

Proposed analyses

1. Employment forecast, by industry--January 1966, January 1968, and January 1970

2. **Employment of professional and skilled workers in selected occupations, by broad industry attachment, 1966, with forecast for 1970**

3. **Employment and training outlook in each of the following selected occupations:**

   Accountants, General and Cost
   Automobile Mechanics
   Boilermakers
   Brickmasons, Stonemasons, and Tile Setters
   Chemical Engineers
   Chemists
   Civil Engineers
   Commercial Artists
   Draftsmen
   Electrical Engineers
   Electricians
   Industrial Engineers
   Machinists
   Maintenance Mechanics
   Mechanical Engineers
   Medical Technicians
   Metallurgists
   Millwrights
   Plumbers and Pipe Fitters
   Refrigeration Mechanics
   Sheet Metal Workers
   Turret Lathe Operators
   Welders and Flame Cutters

IX. The nature of automated jobs in the area and their educational and training requirements

Data to be collected or derived

1. **Data on the extent to which area firms have automated**

2. **Employees' estimates of increases or decreases in number of employees in various skill classification due to automation since 1960**

3. **Data on employer estimates of further automation within next ten years**

4. **Data on extent to which employers have been able to absorb employees whose jobs have been eliminated through automation since 1960**

5. **Employer opinions of ways skill requirements are changing as a result of automation**

6. Information on efforts of employers to prepare employees for the impact of further automation
7. Opinions of employers as to what public education can do to prepare youth and adults to meet conditions of employment in automated business and industry
8. Information on personnel problems created by automation
9. Data on extent to which automation has resulted in replacing workers on existing jobs and in creating new or additional services.

Sources of data and methodology

1. A questionnaire survey (see Instrument E, Appendix) will be used to determine a list of the area firms which have engaged in substantial automation since 1960. Firms will be asked to indicate by using a continuum 0 (none) to 10 (total) the extent to which they are utilizing the following automatic processes:

   Unit record equipment for data processing

   Computer systems for data processing

   Inventory control

   Automatic controls of machinery (Servomechanisms)

   Automatic machinery: preset cycle of operations either fixed or changeable

   Integrated materials--handling and processing equipment

   Materials handling other than integrated materials

   Quality control

   Others (to be specified by respondent)

   In addition, firms will be asked to estimate the decreases or increases in number and percentage of employees in the following skill classifications since 1960 which can be attributed to automation:

   Unskilled
   Skilled
   Supervisory
   Clerical--sales
   Technical
   Managerial

2. The questionnaire returns will form the bases for selecting firms for an intensive interview of appropriate officials on the following specific questions:

   How have the total labor requirements for the firm been affected since the introduction of automation?

   How have the proportion of production, maintenance, supervisory, and clerical workers changed since the introduction of automation?

   What change has there been in total employment in the automated segment of the firm? What change has automation made in the proportions of direct and indirect labor in this segment?

   How many workers have been displaced by automatic machines in the firm? Were other jobs found for them within the company? If so, how many were downgraded, how many were upgraded, and how many moved into jobs similar to the ones they left? If they had to leave the company, how many found jobs in the same locality? In the same industry?

   What was the proportion of skilled and unskilled labor employed in the firm before and after the introduction of automation? What new job skills have been needed? What job skills have been made obsolete?

   How many workers in the firm needed some retraining to handle new jobs created by automation? How was the training accomplished and how long did it take? Who paid for it? Was it done on company time? Did it take place within the plant, or was it necessary to perform it outside? If so, what institution handled the retraining? Was the retraining adequate?

   What special problems did older workers present in automation? How were these handled?

   Did automation create jobs that could not be filled from within the company? If so, how many were there, and how were they filled?

   What are the estimated future demands for skilled, semiskilled, and unskilled labor in the firm?

   How has the present supply and quality of engineers and technical personnel affected the degree and rate of automation of the firm? Has a shortage of trained personnel discouraged any firms from introducing automation?

Are existing area institutions adequate for giving vocational training to adults? Are secondary school programs adequate? Are the high schools teaching skills that will be outmoded before they can be used?

What role can subprofessional training play in providing those workers who do not have engineering backgrounds with sufficient facility in automation skills to fill needed positions? How and by whom, can such training best be provided? To what extent does such training depend on redefinition of job titles and descriptions?

Will engineering and technical skills be the key to the important jobs in an age of automation? Must we train engineers to be managers, or managers to be engineers? Are the skills required of the successful manager in a world of even more complex technology the same as those required in a world where business success depended upon the artful use of insufficient information? If not, what does this imply for management education?

What kind of training can be provided for individuals who have already completed their formal education?

The Present Program of Education in the Area

X. The elementary school program

Data to be collected or derived

1. Enrollment by grade for last ten years
2. Projection of enrollment by grade, 1965-1970
3. The composition of the general curriculum for teaching the basic skills
4. The extent to which the following special curriculum experiences are provided: art, general music, instrumental music, choral music, crafts, general shop, health and physical education, recreation and safety, interscholastic activities, student activities, and foreign languages
5. Information on learning aids, teaching materials, and supplies provided
6. Pupil health services provided
7. Food services provided

8. Attendance services provided
9. Guidance services provided, follow-up, and referrals
10. On-going research programs
11. Distribution of elementary school personnel by position, age, sex, and marital status
12. Level of college training of elementary school personnel
13. Recency of college training of elementary school personnel
14. Years of teaching experience of elementary school personnel
15. Assignments of elementary school personnel compared to college major field
16. Membership of elementary school personnel in professional associations
17. Teaching load of elementary school teachers in terms of total number of pupils assigned and class sizes
18. Salary schedule for elementary school instructional staff and distribution of staff by salary ranges
19. Elementary school teacher turnover for 1963-64, 1964-65, and 1965-66
20. Classification of elementary school teachers leaving teaching during 1963-66 by reasons for leaving
21. Classification of elementary school teachers leaving teaching during 1963-66 according to what they did after leaving
22. Teacher morale
23. Pupil retardation--age-grade distributions
24. Achievement test data
25. Pupil test results on tests of mental maturity

Sources of data and methodology

1. Enrollment by grade--State of Tennessee, Annual Statistical Report of the Department of Education for respective years
2. Projection of enrollment by grade--Projection of future enrollments will be based on evidence of past trends. The

method used to predict school membership in the area for the next five years will be an adaptation of the "cohort survival technique," used by the United States Census Bureau. The technique is based on the establishment of ratios between births and first grade membership six years later and between each grade and the following grade the next year. The trend of "survival" from grade to grade will be the basis for projecting future enrollments by grade.

3. General curriculum for teaching basic skills--Accreditation reports of Nashville Metropolitan Public Schools on file with Tennessee State Department of Education. (See Instrument F, Appendix) The daily schedule of each teacher will be recorded in punch card form.

4. Special curriculum experiences provided--Accreditation reports of Nashville Metropolitan Public Schools on file with Tennessee State Department of Education. (See Instrument F, Appendix)

5. Pupil personnel services provided--Records in office of Director of Schools, Nashville Metropolitan Public Schools

6. Learning aids, teaching materials, and supplies provided--Budget documents and property inventory records of Nashville Metropolitan Public Schools

7. Professional and personal data on elementary school personnel--Nashville Metropolitan Public School Personnel Cards on file with Tennessee State Department of Education (See Instrument G, Appendix) and returns of questionnaire to be administered to each professional employee of school system. (See Instrument H, Appendix)

8. Teaching load of elementary school teachers--Accreditation reports described in (3) and (4) above. (See Instrument F, Appendix)

9. Teacher turnover data--Returns from questionnaire administered to each school principal. (See Instrument I, Appendix)

10. Measures of program outcomes--Data on pupil retardation, pupil achievement test scores, and pupil scores on tests of mental maturity will be compiled from records in central office of Nashville Metropolitan Public Schools.

Proposed analyses

1. Catalog of general curriculum offerings for each elementary school

method used to predict school membership in the area for the next five years will be an adaptation of the "cohort survival technique," used by the United States Census Bureau. The technique is based on the establishment of ratios between births and first grade membership six years later and between each grade and the following grade the next year. The trend of "survival" from grade to grade will be the basis for projecting future enrollments by grade.

3. General curriculum for teaching basic skills--Accreditation reports of Nashville Metropolitan Public Schools on file with Tennessee State Department of Education. (See Instrument F, Appendix) The daily schedule of each teacher will be recorded in punch card form.

4. Special curriculum experiences provided--Accreditation reports of Nashville Metropolitan Public Schools on file with Tennessee State Department of Education. (See Instrument F, Appendix)

5. Pupil personnel services provided--Records in office of Director of Schools, Nashville Metropolitan Public Schools

6. Learning aids, teaching materials, and supplies provided--Budget documents and property inventory records of Nashville Metropolitan Public Schools

7. Professional and personal data on elementary school personnel--Nashville Metropolitan Public School Personnel Cards on file with Tennessee State Department of Education (See Instrument G, Appendix) and returns of questionnaire to be administered to each professional employee of school system. (See Instrument H, Appendix)

8. Teaching load of elementary school teachers--Accreditation reports described in (3) and (4) above. (See Instrument F, Appendix)

9. Teacher turnover data--Returns from questionnaire administered to each school principal. (See Instrument I, Appendix)

10. Measures of program outcomes--Data on pupil retardation, pupil achievement test scores, and pupil scores on tests of mental maturity will be compiled from records in central office of Nashville Metropolitan Public Schools.

Proposed analyses

1. Catalog of general curriculum offerings for each elementary school

2. Distribution of the elementary schools by special curriculum experiences provided
3. Trends in expenditures by school for learning aids, teaching materials, and supplies--1956-1966
4. General description of pupil services provided
5. Sex of elementary school instructional personnel by position
6. Age distribution of elementary school instructional personnel
7. Marital status of elementary school teachers by sex
8. Distribution of elementary school teachers by highest college degree held
9. Distribution of elementary school teachers by total years of teaching experience
10. Distribution of elementary school teachers by years in school system
11. Distribution of elementary school teachers by recency of college training
12. Annual salaries of elementary school teachers
13. Distribution of elementary school classes by size categories
14. Elementary school teacher estimates of factors affecting morale
15. Number of elementary school teachers leaving teaching during 1963-66, reasons for their leaving, and analysis of where they went after leaving teaching
16. Age-grade distribution of pupils
17. Comparison of local achievement test scores with performance of norming population

XI. The secondary school program

Data to be collected or derived

1. Size of high schools
2. Enrollment by grade
3. Projected enrollment by grade

4. Academic courses (nonvocational) offered in each high school
5. Pupil enrollment in each academic course offered by section of course
6. Vocational courses offered in each high school
7. Pupil enrollment in each vocational course offered by section of course
8. Extraclass activities--extent of pupil participation
9. Information on learning aids, teaching materials, and supplies provided
10. Pupil health services provided
11. Food services provided
12. Attendance services provided
13. Guidance services provided, follow-up, and referrals
14. Ongoing research programs
15. Distribution of secondary school personnel by position, age, sex, and marital status
16. Level of college training of secondary school personnel
17. Recency of college training of secondary school personnel
18. Years of teaching experience of secondary school personnel
19. Assignments of secondary school personnel compared to areas of certification
20. Membership of secondary school personnel in professional associations
21. Teaching load of secondary school teachers in terms of total number of pupils assigned daily, class sizes, and number of different preparations daily
22. Salary schedule for secondary school instructional staff and distribution of staff by salary ranges
23. Secondary school teacher turnover for 1963-64, 1964-65, and 1965-66
24. Classification of secondary school teachers leaving teaching during 1963-66 by reasons for leaving

25. Classification of secondary school teachers leaving teaching during 1963-66 according to what they did after leaving

26. Data on secondary school teacher morale

27. Data on secondary school pupil retardation--age-grade distributions

28. Achievement test data

29. Pupil test results on tests of mental maturity

Sources of data and methodology

1. Enrollment by grade--State of Tennessee, Annual Statistical Report of the Department of Education for respective years

2. Projection of enrollment by grade--The method used to predict school membership was discussed earlier in this report under the elementary school program.

3. Academic and vocational courses provided and pupil enrollment by course--Accreditation reports of Nashville Metropolitan Public Schools on file with Tennessee State Department of Education (See Instrument J, Appendix)

4. Pupil personnel services provided--Records in office of Director of Schools, Nashville Metropolitan Public Schools

5. Learning aids, teaching materials, and supplies provided--Budget documents and property inventory records of Nashville Metropolitan Public Schools

6. Professional and personal data on secondary school personnel--Nashville Metropolitan Public School Personnel Cards on file with Tennessee State Department of Education (See Instrument G, Appendix) and returns of questionnaire to be administered to each professional employee of school system (See Instrument H, Appendix)

7. Teaching load of secondary school teachers--Accreditation reports described in (3) above (See Instrument J, Appendix)

8. Teacher turnover data--Returns from questionnaire administered to each school principal (See Instrument I, Appendix)

9. Measures of program outcomes--Data on pupil retardation, pupil achievement test scores, and pupil scores on tests of mental maturity will be compiled from records in central office of Nashville Metropolitan Public Schools.

Proposed analyses

1. Distribution of secondary schools by size
2. Distribution of secondary schools by number of course units offered in all subjects
3. Distribution of secondary schools by number of course units offered in language arts
4. Distribution of secondary schools by number of course units offered in foreign languages
5. Distribution of secondary schools by number of course units offered in science
6. Distribution of secondary schools by number of course units offered in social studies
7. Distribution of secondary schools by number of course units offered in mathematics
8. Distribution of secondary schools by number of course units offered in agriculture
9. Distribution of secondary schools by number of course units offered in business education
10. Distribution of secondary schools by number of course units offered in home economics
11. Distribution of secondary schools by number of course units offered in industrial arts
12. Distribution of secondary schools by number of course units offered in trade and industrial education
13. Distribution of secondary schools by number of course units offered in art
14. Distribution of secondary schools by number of course units offered in music
15. Number and percentage of secondary school pupils by total number of course units available
16. Percentage distribution of secondary school pupils by number of course units available in selected subject areas
17. Number and percentage of secondary school pupils taught each subject area by teachers without subject endorsement on teaching certificate

18. Trends in expenditures, by school, for learning aids, teaching materials, and supplies--1956-1966
19. General description of pupil services provided
20. Sex of secondary school instructional personnel by position
21. Age distribution of secondary school instructional personnel
22. Marital status of secondary school teachers by sex
23. Distribution of secondary school teachers by highest college degree held
24. Distribution of secondary school teachers by total years of teaching experience
25. Distribution of secondary school teachers by years in school system
26. Distribution of secondary school teachers by recency of college training
27. Distribution of secondary school teachers by annual salary categories
28. Per cent of classes in secondary schools within various class size categories by subject area
29. Secondary school teacher estimates of factors affecting morale
30. Number of secondary school teachers leaving teaching during 1963-66, reasons for leaving, and analyses of where they went after leaving teaching
31. Age-grade distribution of secondary school pupils
32. Comparison of local school achievement test scores with performance of norming population

XII. Extent and nature of the school dropout problem--1966-67

Data to be collected or derived

1. Number of dropouts during school year
2. Distribution of dropouts by race
3. Distribution of dropouts by sex

4. Age of dropouts
5. Grade of dropouts
6. Academic retardation of dropouts
7. Participation of dropouts in extracurricular activities
8. Extent to which dropouts had formal guidance counseling
9. Intelligence ratings of dropouts
10. Educational attainment of parents of dropouts
11. Absence records of dropouts
12. Other sibling dropouts in same family
13. Reasons given by students for dropping out
14. Schools' evaluation of reasons for dropouts
15. Number of dropouts referred to employment counselors in local Employment Security agency

Sources of data and methodology

1. Data on dropouts will be collected by the visiting teachers of the metropolitan public school system in cooperation with classroom teachers and guidance counselors.
2. To insure uniformity, data will be recorded on a uniform record card designed for keypunching to machine cards. (See Instrument I, Appendix)
3. Data on referrals of dropouts to employment counselors will be compiled from records of the local office of the Tennessee Department of Employment Security.

Proposed analyses

1. Number of school dropouts during 1966-67 school year by race and by sex
2. Ages of dropouts during 1966-67 school year by race and by sex
3. Grade of dropouts during 1966-67 school year by race and by sex

4. Distribution of dropouts during 1966-67 school year by number of years of academic retardation and by race and by sex
5. Distribution of dropouts during 1966-67 school year by extent of participation in school extracurricular activities and by race and by sex
6. Extent to which dropouts during 1966-67 school year received formal counseling by source of counseling and by race
7. Distribution of dropouts during 1966-67 school year by intelligence rating and by race
8. Distribution of dropouts during 1966-67 school year by the educational attainment of their parents and by race
9. Distribution of dropouts during 1966-67 school year by the percentage of days absent before actual separation from school and by race
10. Number of dropouts by race who had an older brother or sister who also dropped out of school
11. Students' evaluation of reasons for dropouts by race and by sex
12. Schools' evaluation of reasons for dropouts by race and by sex
13. Number of referrals of 1966-67 school year dropouts to area office, Division of Employment Security by source of referral and by types of services rendered

XIII. The public school vocational program for out-of-school youth and adults

Data to be collected or derived

1. Data on scope of young farmer programs
2. Enrollments of out-of-school youth in young farmer programs
3. Data on scope of adult farmer programs
4. Enrollments in adult farmer programs
5. Data on scope of apprenticeship programs for out-of-school youth and adults

6. Enrollments in apprenticeship programs
7. Data on scope of occupational extension programs for out-of-school youth and adults
8. Enrollments in occupational extension programs
9. Data on scope of evening and part-time classes in home economics for out-of-school youth and adults
10. Enrollments in home economics classes for out-of-school youth and adults
11. Data on scope of evening distributive education classes for employed persons
12. Enrollments in evening distributive education classes
13. Data on scope of out-of-school youth and adult extension programs in practical nursing and other health occupations
14. Enrollments in out-of-school youth and adult extension programs in practical nursing and other health occupations
15. Data on scope of area technical education programs for out-of-school youth and adults
16. Enrollments of out-of-school youth and adults in area technical education programs
17. Data on Area Redevelopment and Manpower Development projects

Sources of data and methodology

1. Basic data on the public school programs for out-of-school youth and adults will be derived from the Annual Reports of the Tennessee State Board for Vocational Education for 1961-62, 1962-63, 1963-64, 1964-65, and 1965-66.
2. Additional information on out-of-school youth and adult vocational education programs will be secured (1) from interviews with the appropriate officials of the Division of Vocational Education, Tennessee, State Department of Education, (2) from interviews of appropriate officials of the Nashville Metropolitan Public Schools, and (3) from records of the Nashville Metropolitan Public Schools.

Proposed analyses

1. General descriptions of the scope of the various vocational education programs for out-of-school youth and adults in the area

2. Trends in enrollments of out-of-school youth in various vocational education programs in the area for the five-year period 1960-1965

3. Trends in enrollments of adults in various vocational education programs in the area for 1960-1965

XIV. Other opportunities for vocational and technical education in the metropolitan area

Data to be collected or derived

1. Data on the scope of the vocational and technical programs in institutions of higher education in the area

2. Enrollments in vocational and technical programs in institutions of higher education in the area

3. Data on educational programs of business and industry in the area--scope and number of employees enrolled

4. Data on educational programs of organized labor--scope and number enrolled

5. Data on educational programs of proprietary schools--scope and number enrolled

Sources of data and methodology

1. Programs in higher education--Bulletins and catalog of courses offered for 1965-66 academic year in respective institutions, records in offices of Registrars of respective institutions, and interviews with officials of respective institutions

2. Programs of business and industry--interview with appropriate officials and official records of firms

3. Programs of proprietary schools--interview with appropriate officials and enrollment records of school

4. Programs of organized labor--interview with appropriate officials and records kept

Proposed analyses

1. General description of the opportunities for vocational and technical education provided in institutions of higher education, in proprietary schools, by business and industry, and by organized labor

2. Trends in enrollments in the various institutions and firms by type of program

Implications for Changes in the Program of Education in the Area

This study will provide the basis for assessing the implications for changes in the program of education presently provided by both public and private resources in the metropolitan area. Prerequisite to sound assessment of these implications is a consideration of (1) basic background information on the area, and (2) specific information on the extent to which industries are automating, the nature of automated jobs in the area, and the educational and training requirements of these automated jobs. These considerations will furnish valid clues to the types of educational programs necessary to stimulate automation to best advantage and, at the same time, may minimize any harmful effects that may accompany it. Once the necessary educational program is defined, this program must then be compared with the present program of education in the metropolitan area. The gaps between the desired program and the present program will be the basis for recommending changes in the present program.

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APPENDIX

INSTRUMENT A

UNEMPLOYED YOUTH SURVEY QUESTIONNAIRE

Circle appropriate answer

1.	Does a boy or girl age 16 through 20 live here? (If answer is no, go to next house. If answer is yes, proceed to next question.)	Boy	Girl	No		
2.	Does he/she go to day school? (If answer is yes, go to next house.)	Yes	No	Uncertain		
3.	Is he/she in the armed service now? (If answer is yes, go to next house. If answer is no, proceed to next question.)	Yes	No	Uncertain		
4.	Is he/she at home? (If he/she is at home, ask to talk to him/her.)	Yes	No	Uncertain		

5.	Does he/she have a full-time job? (If answer is yes, go to question 10. If answer is no, ask questions 6, 7, 8, 9.)	Yes	No	Uncertain		
6.	Has he/she had a full-time job?	Yes	No	Uncertain		
7.	Does he/she feel that he/she could get a job if he/she could get training in a school?	Yes	No	Uncertain		
8.	If yes, what type of training?	______________				
9.	Does he/she want to return to school for such training?	Yes	No	Uncertain		

10.	Has he/she been out of school 2 or more years?	Yes	No	Uncertain		
11.	Has he/she been out of school less than one year?	Yes	No	Uncertain		
12.	Did he/she graduate from high school?	Yes	No	Uncertain		
13.	If answer to question 12 is no, did he/she complete the 9th grade?	Yes	No	Uncertain		
14.	Is he/she married?	Yes	No	Uncertain		
15.	Has he/she been in the armed service?	Yes	No	Uncertain		
16.	How old is he/she now?	16	17	18	19	20
17.	Race	White	Negro	Other		
18.	Information obtained from:	1. Person concerned 2. Another person				

INSTRUMENT B

Questionnaire on Leading Job Opportunities in Area for Noncollege-Bound High School Graduates

To Directors of Personnel:

Please list below the ten or fewer occupations of your firm that offer the best beginning employment opportunities to noncollege-bound high school graduates.

1 2 3

( ) ( ) ( ) 1. ______________________________

( ) ( ) ( ) 2. ______________________________

( ) ( ) ( ) 3. ______________________________

( ) ( ) ( ) 4. ______________________________

( ) ( ) ( ) 5. ______________________________

( ) ( ) ( ) 6. ______________________________

( ) ( ) ( ) 7. ______________________________

( ) ( ) ( ) 8. ______________________________

( ) ( ) ( ) 9. ______________________________

( ) ( ) ( ) 10. ______________________________

In parentheses column 1 above, please check ( ) each occupation in which on-the-job training is provided for beginning employees.

In parentheses column 2 above, please check ( ) each occupation in which your firm prefers the high school to train graduates in job skills as a prerequisite for beginning employment.

In parentheses column 3 above, please check ( ) each occupation for which your firm requires high school graduation as a prerequisite for employment.

INSTRUMENT C

Form for Recording Job Placements by Industry Classification and by Occupation

Instructions: Please distribute job placements made through your institution for the calendar year _____ by the following industry classifications and occupations:

	Occupation					
Industry	Professional and Managerial	Clerical and Sales	Service	Skilled	Semi-Skilled	Unskilled
Durable Goods Manufacturers	____	____	____	____	____	____
Non-Durable Goods Manufacturers	____	____	____	____	____	____
Hospitals, Hotels, Restaurants, and Miscellaneous Services	____	____	____	____	____	____
Transportation, Communication, and Public Utilities	____	____	____	____	____	____
Trade, Finance, Insurance, Real Estate Education and Government	____	____	____	____	____	____
Construction, Mining, Agriculture, and Forestry Services	____	____	____	____	____	____

INSTRUMENT D **January 1966**

Questionnaire on Manpower and Training Needs

Name of Establishment ______________________________

I	II	III	IV	V	VI	VII	VIII
Classification	Total number employed currently	Total number anticipated by January, 1968	Total number now in training	Additional workers needed to be trained by 1968	Total number anticipated by January, 1970	Additional workers needed to be trained by 1970	Have difficulty finding qualified workers

Instruction sheet attached

Instrument D: Instruction Sheet

1. List in column I all present job classifications and any anticipated classifications to be added by 1970.
2. List in column II the number currently employed in each job classification.
3. List in column III the number to be employed by January 1968 in each job classification according to your present plans and best estimates.
4. List in column IV the number currently in training in your plant for each job classification.
5. List in column V the number of additional workers needed to be trained by 1968 over and above those now in training in your plant.
6. List in column VI the number to be employed by January 1970 in each job classification according to your present plans and best estimates.
7. List in column VII the number of additional workers needed to be trained by 1970 over and above those now in training in your plant.
8. In column VIII check all job classifications in which you have experienced difficulty in securing qualified workers.

INSTRUMENT E

Questionnaire to Area Firms on Extent of Automation

I. Indicate by using a continuum 0 (none) to 10 (total) the extent to which your firm makes use of the following automated processes:

A. Inventory Control ____________

B. Automatic Controls of Machinery (Servomechanisms) __________

C. Automatic Controls of Machinery: Preset Cycle of Operations Either Fixed or Changeable __________

D. Integrated Materials--Handling and Processing Equipment _________

E. Materials Handling Other Than Integrated Materials ________

F. Quality Control _________

G. Unit Record Equipment for Data Processing _________

H. Computer Systems for Data Processing _________

I. Other (Please Specify) _________

II. To what extent has your work force changed since January 1, 1960 as a result of automation? Please estimate percentage change in each occupation category.

Occupation	Decrease	Increase
White Collar Jobs		
Managerial	_____	_____
Technical Work	_____	_____
Clerical--Sales	_____	_____
Blue Collar Jobs		
Supervisory (Foremen)	_____	_____
Skilled	_____	_____
Semiskilled	_____	_____
Unskilled	_____	_____

Name of Firm ______________________________

Address ______________________________

Name and Title of Respondent ______________________________

INSTRUMENT F

Preliminary Report for the Approval of Tennessee Public Schools, Grades 1-8

Name of School District
School Year

Name of School
Address of School
Signature of Principal

Teacher Number	Name of Teacher	Type of Certificate	Certificate Number	Degrees Held	Courses or Grades Certified to Teach	Courses or Grades Taught this Year	Exceptions
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							

INSTRUMENT F (Continued)

Name of Teacher ____________________

Time	Subject or Block of Time in Subject Area	Number of Pupils in Class or Block

INSTRUMENT G

I. B. M. Card Format--Teacher Personnel Data, Tennessee State Department of Education

Card Columns	Personnel Data
1-6	Teacher Number
7-17	School Number
18	Race and Sex
19-24	Certificate Number
25-50	Areas of Certification
51-52	Kind of Certificate
53-54	Degrees Held
55-56	Total Years Teaching Experience
57-60	State Minimum Salary
61-64	State Salary Supplement
65-68	School System Salary Supplement
69-72	Total Salary
73-74	College Code
75	Blank
76-79	Full or Part-time Code
80	Control Code

INSTRUMENT H

Check List for Professional Personnel

School ______________________ Completed by: ______________________

DIRECTIONS: Please supply the information requested in this check list by circling the number of the correct response to questions where responses are provided or by filling in the blanks.

1-2. Reserved for school code.

3. Your race: 1. White 2. Negro

4. Your sex: 1. Male 2. Female

5-6. Your age in years: ______

7. Your marital status: 1. Single 2. Married

8. Your present position: 1. Teacher 2. Principal 3. Supervisor

9. Grade organization in which you teach: 1. Grades 1-6 2. Grades 1-8
3. Grades 7-9 4. Grades 7-12 5. Grades 9-12 6. Grades 10-12
7. Other (specify) ____________

10. College training you have completed:
1. Less than one year 5. Bachelor's degree
2. One year 6. Master's degree
3. Two years 7. Post-master's
4. Three years 8. Doctor's degree

11. Type of professional training within last five years:
1. Regular year, full-time 3. Summer school
2. Regular year, part-time 4. Extension

12. What is your estimate of the quantity and quality of professional literature available to you? 1. Excellent 2. Average 3. Inferior

13. Is the major portion of your teaching this year in the area of your college major? 1. Yes 2. No

14. How many courses are you teaching for which you are not certificated?
0 1 2 3 4

15-16. Your total teaching experience in years: (Count this year) ________

17-18. Total years in present position: (Count this year) _______

19-20. Number of pupils assigned to you if you teach self-contained elementary classroom: ________

21-23. Number of pupils assigned daily if you teach departmentalized elementary or high school grade: (Exclude study halls and student activities) ______

24-25. Average number of hours spent weekly in extracurricular assignments: ______

26-27. Average number of hours spent weekly in total school responsibilities: _____

28. Do you teach two grades in the same room at the same time? 1. Yes 2. No

29. Do you have a period in the daily schedule during which you are free from teaching responsibilities? 1. Yes 2. No

30. What is your estimate of your teaching load?

1. Low 2. Average 3. High

31. Professional organizations in which you hold membership:

1. National Education Association
2. State Education Association
3. Local Education Association
4. American Childhood Educ. Ass'n.
5. Classroom Teachers Association
6. Other ________________________

32. To what extent do you participate in the development of the general policies within your school?

1. To a great extent 2. Some 3. Little 4. None

33. To what extent do you participate in the development of the general educational policies for your school system?

1. To a great extent 2. Some 3. Little 4. None

34-37. Your present annual contract salary: ____________

38. Are you employed in non-school employment during the present school year?

1. Yes 2. No

39-40. If answer to item 38 is "yes," how many hours do you average weekly in this non-school employment? _________

41. How do you rate the physical facilities in the school in which you teach?

1. Unsatisfactory 2. Satisfactory 3. Excellent

42. How do you rate the quality and the quantity of teaching material available to you? 1. Unsatisfactory 2. Satisfactory 3. High

43. What is your estimate of teacher morale in your school?

1. High 2. Average 3. Low

44. What are the chief obstacles to higher teacher morale in your school?

____

____

____

45. Do you plan to continue teaching as a career?

Yes ________ No ________ Undecided ________

46. If you were choosing a career now, would you select teaching?

Yes ________ No ________ Undecided ________

47. Please identify what you consider to be areas of strength in your school system. ______________________________

____

____

48. Have you encountered problems which interfered with your teaching efficiency? Yes ______ No ______ If so, please list.

____

____

____

49. Specify the most valuable kind of supervisory assistance you received last year: ______________________________

50. What kinds of supervisory services do you now desire but do not receive?

____

INSTRUMENT I

Questionnaire on Teacher Turnover

School ______________________________ Principal ______________________________

Please furnish the following information on teachers assigned to your school who left teaching in the Nashville Metropolitan Public Schools during, or at the end of, school years 1963-64, 1964-65 and 1965-66.

1. Number of teachers leaving teaching in school system:

Year	Men	Women	Total
1963-64	____	____	____
1964-65	____	____	____
1965-66	____	____	____

2. Classify, by number, the teachers leaving according to what they did on leaving:

	1963-64		1964-65		1965-66	
What they did	Men	Women	Men	Women	Men	Women
Accepted other teaching position	____	____	____	____	____	____
Accepted nonschool position	____	____	____	____	____	____
Returned to full time homemaking	xxxxx	____	xxxxx	____	xxxxx	____
Did other things	____	____	____	____	____	____

3. Classify, by number, the teachers leaving by the major reason, in your opinion, for their leaving:

	1963-64		1964-65		1965-66	
Reason	Men	Women	Men	Women	Men	Women
Opportunity to earn higher salary	____	____	____	____	____	____
Moved or desired to be with husband	xxxxx	____	xxxxx	____	xxxxx	____
Not offered reemployment	____	____	____	____	____	____
Desire to raise a family	xxxxx	____	xxxxx	____	xxxxx	____
Reached compulsory retirement age	____	____	____	____	____	____
Reasons of health	____	____	____	____	____	____
Heavy teaching load	____	____	____	____	____	____
Other	____	____	____	____	____	____

INSTRUMENT J

Preliminary Report for the Approval of Tennessee Public Schools, Grades 7-12

Name of School District

School Year

Name of School

Address of School

Signature of Principal

Teacher Number	Name of Teacher	Type of Certificate	Certificate Number	Degrees Held	Courses or Grades Certified to Teach	Courses or Grades Taught this Year	Exceptions
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							

INSTRUMENT J (Continued)

Teacher Number	Name of Teacher	Courses and Number of Pupils Taught by Period											
		Period 1		Period 2		Period 3		Period 4		Period 5		Period 6	
		Course	Number of Pupils	Course	Number of Pupils	Course	Number of Pupils	Course	Number of Pupils	Course	Number of Pupils	Course	Number of Pupils
1.													
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													
11.													
12.													

INSTRUMENT K

Card for Recording Data on School Dropouts

Directions: Record information on individual dropout by circling the appropriate code number or by filling in the blank.

Name of Student ______________________________

1. Race: 1. White 2. Negro 3. Other

2. Sex: 1. Male 2. Female

3-4. Age to nearest birthday ________

5. Grade in school ________

6. Number of years of academic retardation __________

7. Participation in extracurricular activities: 1. Many 2. Few 3. None

8. Source of counseling received prior to dropping out:

   1. Counselor 2. Teacher 3. No one

9. Intelligence rating: 1. Superior 2. Average 3. Below Average 4. Retarded

10. Educational attainment of mother:

    1. Less than fifth grade
    2. More than fifth grade but less than eighth
    3. More than eighth grade but less than high school graduation
    4. High school graduate
    5. More than high school but less than college graduation
    6. College degree
    7. Information not available

11. Student's evaluation of major reason for dropout:

    1. Lack of parental support and encouragement
    2. Curriculum was not meeting pupil's needs
    3. Extreme poverty
    4. Poor health

5. School's lack of concern about dropouts
6. Community's lack of concern about dropouts
7. Inadequate counseling service
8. To marry
9. To enter armed forces
10. Academic retardation
11. Personality conflict with teachers and/or principal
12. Lack of vocational courses appropriate to job opportunities
13. Other reasons (Specify) ______________________________

____

12. School's evaluation of major reason for dropout:
    1. Lack of parental support and encouragement
    2. Curriculum was not meeting pupil's needs
    3. Extreme poverty
    4. Poor health
    5. School's lack of concern about dropouts
    6. Community's lack of concern about dropouts
    7. Inadequate counseling service
    8. To marry
    9. To enter armed forces
    10. Academic retardation
    11. Personality conflict with teachers and/or principal
    12. Lack of vocational courses appropriate to job opportunities
    13. Other reasons (Specify) ______________________________

    ____